

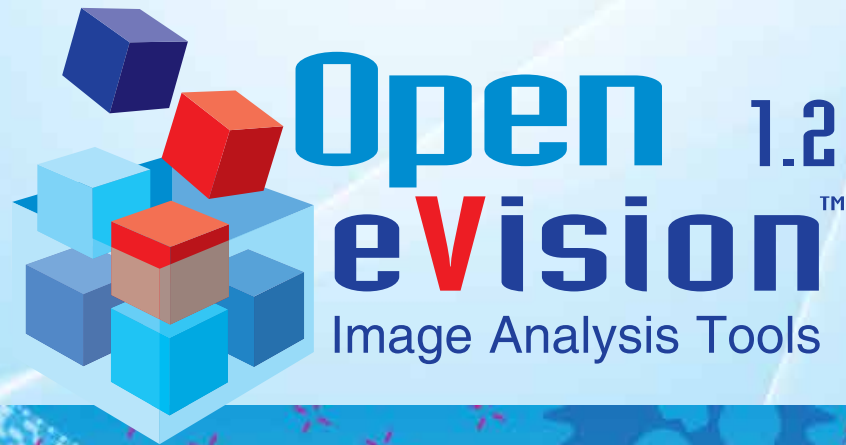


Image Analysis Software Tools



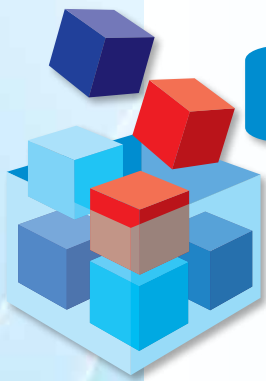
New Features

- 64-bit libraries for C++ and .NET development
- Open eVision Dongle-Based Licenses on Euresys parallel or USB dongles
- Seamless compatibility with eVision 6.7.1 and Open eVision 1.0 C++ and ActiveX APIs

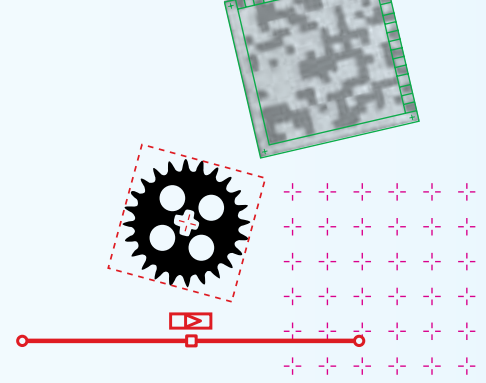


Free evaluation
of the Open eVision
functionalities





Open 1.2 eVision™ Image Analysis Tools



Open eVision 1.2 is a rich suite of reliable, powerful and flexible software tools dedicated to image processing and analysis. Open eVision contains a set of 64-bit and 32-bit libraries designed to be integrated into your C++, .NET or ActiveX application.

The general purpose libraries, EasyImage, EasyColor, EasyObject, EasyMatch, EasyFind and EasyGauge cover applications such as image filtering and enhancement, blob analysis, pattern matching, alignment and metrology.

The mark inspection libraries, EasyOCV, EasyOCR, EasyBarCode and EasyMatrixCode, include functions for optical character recognition, character printing inspection and 1D / 2D barcode reading.

General Features

- **Easy to learn and use**
- **Robust, flexible and powerful**
- **Accurate: sub-pixel measurement and calibration**
- **Thread-safe**
- **64-bit libraries for C++ and .NET and 32-bit libraries for C++, .NET or ActiveX development**
- **Compatible with**
 - Windows® x86 processor architecture
 - A wide variety of programming languages and development environments

Open eVision Libraries

General-Purpose Libraries

Open eVision includes a set of six general-purpose libraries.

- EasyImage™** Image processing
- EasyColor™** Color calibration and transformation
- EasyObject™** Blob analysis
- EasyMatch™** Standard pattern matching
- EasyFind™** Geometric pattern matching
- EasyGauge™** Sub-pixel measurement and dimension control

Mark Inspection Libraries

These robust and automatic libraries support a large range of fonts, standards or symbol types.

- EasyOCV™** Optical Character Verification
- EasyOCR™** Optical Character Recognition
- EasyBarCode™** Bar Code reading
- EasyMatrixCode™** Data Matrix 2D code reading



Open to All Image Sources

The Open eVision libraries do not rely on any proprietary hardware device to run. They are able to process images available in the host memory, whatever their origin.

The images to be processed may come from a frame grabber, a scanner, a file, or IEEE1394 (Firewire), GigE Vision or USB cameras. Color and monochrome images are supported.



New

Support of the previous Open eVision and eVision APIs

Open eVision 1.2 comes with an alternate set of C++ headers and an ActiveX component that allows developing or porting code against the older API that was supplied with eVision 6.7.1 (and lower) and Open eVision 1.0. See the "Migration to Open eVision 1.2" pdf document on www.euresys.com for detailed information.



Sub-pixel Accuracy and Calibration

Accuracy is of prime importance to most machine vision applications. To meet this requirement, Open eVision's metrology (EasyGauge), blob analysis (EasyObject), standard pattern matching (EasyMatch) and geometric pattern matching (EasyFind) functions all return results with sub-pixel accuracy.

To further increase the precision of the measurements, Open eVision includes an extensive set of calibration functions. These functions, after a calibration phase that can be performed from the image of a precise dot grid or from a list of point coordinates, compensate all measurements for lens distortion (correction of pin cushioning, barreling), non-square pixels (correction of the pixel aspect ratio) and rotation and perspective distortions.

They also provide the capability of working in real-world measurement units (such as mils, microns or millimeters), and support the conversion of coordinates from pixel coordinates to real-world coordinates and vice-versa.

Saving and Loading Images

Open eVision supports loading and saving images from/to the disk. In addition to the existing image formats -BMP, JPEG, TIFF- Open eVision now supports **JPEG-2000**, **PNG** (a supports lossless compression) and **Serialized** (proprietary image file format obtained from the serialization of the Open eVision image objects) formats.

On top of this, Open eVision includes an **automatic conversion of the file format** regardless of the pixel format from an image on the disc into the best matching Open eVision image object type.

Regions of Interest and Flexible Masks

The processing speed of an image can be accelerated by focusing on a specific region of the image (Region of Interest) avoiding interferences from the remainder of the image. The number of pixels to consider is then reduced.

The processing of all Open eVision functions can be restricted to a Region of Interest (ROI). Open eVision supports nested rectangular ROIs, which are organized in a hierarchical way in each image.

To add flexibility to the shape of the ROI, Open eVision supports **Flexible Masks** for selected functions of the EasyObject and EasyImage libraries. A mask represents a two-class segmentation of pixels which separates the associated image in do-care areas (that must be considered) and don't-care areas (that should not be considered). Flexible masks support complex and disconnected shapes.



Flexible Masks

Image and Graphic Display

Open eVision also includes functions to help display the result of the image analysis, and provide interactivity with the user. For example, Regions of Interest, EasyGauge measurement gauges, blobs computed with EasyObject, patterns located with EasyMatch and EasyFind, characters and codes read with EasyOCR, EasyMatrixCode and EasyBarCode can easily be displayed on top of the image.

Improved Execution Time Thanks to SSE2 Technology

Debugging and Profiling Functions: Open eVision supports modern error tracing functions, and provides precise execution time measurement functions for application profiling.

Thread-Safety: Open eVision is multi-thread safe. This means that it is designed to support simultaneous execution by multiple threads on the same CPU. This is particularly suitable if your application includes independent tasks and allows them to be executed simultaneously. But this also requires that your application accepts sharing piece of data to be accessed by only one thread at any given time. Then, you can design such applications so that each part is controlled by a separate thread. As many threads as required can be created.

Supported Environments

Open eVision are 64-bit and 32-bit libraries that require a processor compatible with the x86 instruction set, with MMX extensions. If the SSE or SSE2 extensions are present, they are used, but they are not required.



Open eVision™ Accessories



Evaluation

This freely downloadable application allows you to evaluate the Open eVision functionalities. Open eVision Eval benefits from an intuitive graphical user interface. All Open eVision functions can be called through easy-to-understand menus grouped by library. After selecting a function, you can interactively set its parameters through dialog boxes and trigger the execution of the function. A new Getting Started guide documents the Open eVision Eval Graphical user interface.

To take your first steps in Open eVision, Open eVision Eval comes with new Quick Start Tutorials. They point up the main functionalities of Open eVision in a didactic way. The Quick Start Tutorials come with a large set of images to practice the lessons by yourself. Finally, Open eVision Eval allows you to evaluate the applicability and performance of Open eVision in your particular application with your images.

➤ [Download it from www.euresys.com](http://www.euresys.com) for free!





Learning

Structured Documentation

Open eVision comes with a comprehensive and re-structured documentation per programming interface (C++, .NET and ActiveX). Each of the three documentations is split into a Functional Guide and a Programming Guide. The Programming Guide includes a comprehensive Reference Guide in addition to the practical Code Snippets for each of the concepts explained in the Functional Guide. The documentation is available in two formats: compiled HTML files, which are convenient to search, as well as printer-friendly PDF files.

Practical and Didactic Project and Application Samples

The **project samples** illustrate concisely how to use the Open eVision libraries with a particular IDE. A project sample exists for each of the supported IDEs.

The **application sample** programs illustrate the combined use of different libraries in a specific application. A variety of combination and applications are represented.

Both are downloadable from the Open eVision Download Area.

Development

Open eVision Studio 1.2 is the development and prototyping tool of Open eVision. It includes the scripting function that generates the code (C++, Visual Basic ActiveX) using easy to understand menus and dialog boxes. The code is copied and pasted into your application source code in their preferred IDE. A new Getting Started guide documents the Open eVision Studio graphical user interface.

To take your first steps in Open eVision, Open eVision Studio is delivered with new Quick Start Tutorials. They point up the main functionalities of Open eVision in a didactic way. The Quick Start Tutorials come with a large set of various images to practice the lessons by yourself.





Open eVision™ Libraries



EasyImage™ Image Processing Library

Main Features

Convolution and morphology
Geometric transformations
Image statistics
16-bit accuracy processing

Typical Applications

Image enhancement
Image restoration
Presence / Absence check

EasyImage includes operations usually performed as pre-processing steps to improve the image quality and obtain a good contrast between the background and the objects to be inspected. EasyImage supports gray-level and color images. Selected morphology functions are also optimized for binary (1-bit per pixel) and bi-level images. EasyImage includes numerous image processing functions, such as enhancement and restoration by linear or non-linear filtering, arithmetic and logic operations, geometric transformations for image registration, histogram analysis for thresholding, projection, ...

Refactoring improving the execution time due to SSE2 technology

Flexible Masks for selected image analysis functions. They provide a powerful way of restricting the processing to freely parts of the image.

Interest Point Detectors

Canny Edge Detector

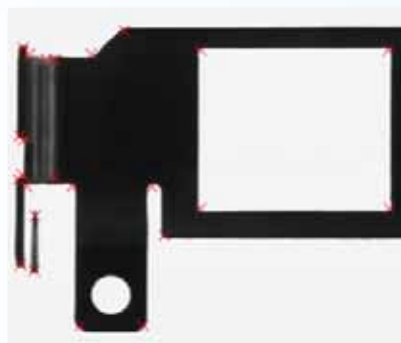
The Canny detector is known as the optimal edge detector. It operates on a gray-scale BW8 image and delivers a black-and-white BW8 image where pixels have only 2 possible values, 0 and 255. Pixels corresponding to edges in the source image are set to value 255 while other pixels are set to value 0. The Canny edge detector offers three optimal characteristics for the image processing applications:

- A good detection: find as many edges in the image as possible
- A good localization: the found edges are as close as possible to the "real" edges in the image
- A minimal response: a single edge response is accepted for each position, i.e. avoiding multiple close or intersecting edge responses

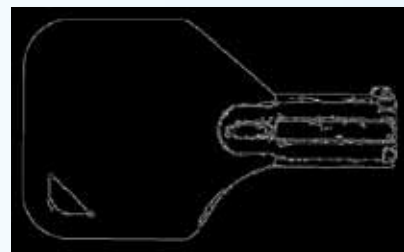
Harris Corner Detector

The Harris corner detector is popular due to its strong invariance to rotation, illumination variation and image noise. It operates only on a gray-scale BW8 image. The Harris Corner Detector delivers a vector of points of interest. The following characteristics are available for every point of interest:

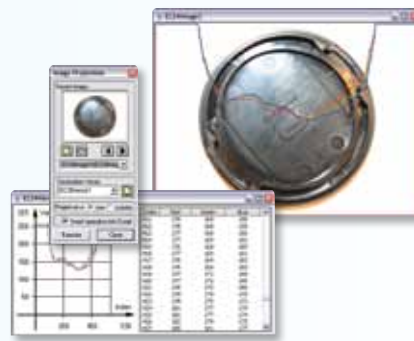
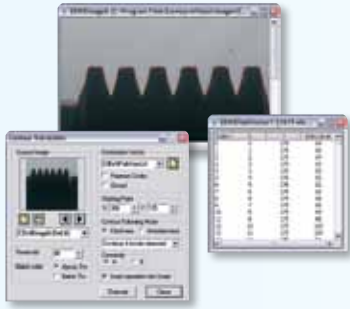
- The corner position (pixel coordinates with sub-pixel accuracy if enabled)
- The cornerness measure
- The magnitude of the gradient w.r.t. the differentiation scale σ_d
- The value of the gradient along the X-axis w.r.t. the differentiation scale σ_d
- The value of the gradient along the Y-axis w.r.t. the differentiation scale σ_d



Harris corner detector



Canny edge detector



Functions

Intensity scale transformation functions

- Gain / Offset change
- Normalization
- Uniformization
- Lookup mapping

Thresholding

- Automatic thresholding
Min residue, max entropy, isodata
- Manual thresholding
Single threshold (absolute and relative)
Double threshold
- Histogram-based threshold

Arithmetic and logic operations

- Arithmetic operations:
Add, Subtract
Multiply, divide
Copy
Invert, module, shift
- Logical and bitwise operations:
AND, OR, XOR, NOT
- Minimum, maximum
- Pixel compare
- Histogram equalization

Convolution

- Pre-defined filters for
Edge detection:
Laplacian, Gradient, Prewitt, Sobel, Roberts
Sharpening:
Several high-pass filters
Smoothing:
Several low-pass including Gaussian filter and uniform filters
- Custom kernel filtering
Kernel creation and management functions

Non-linear filtering

- Morphological operators
Erosion, dilation
Opening, closing
Thinning, thickening
Top-hat filters
Hit-and-miss transform:
It detects a particular pattern of foreground and background pixels in an image
Morphological distance
- Median filter

Geometric transformations

- Image registration (alignment)
- Horizontal and vertical mirroring
- Translation, scaling and rotation with optional interpolation
- LUT-based (un)warping

Vector operations

- Projection
- Profile: sampling (line segment, path, contour) and analysis

Statistics

- Measurement of:
 - Area, binary moments
 - Weighted moments
 - Gravity center
 - Pixel count and pixel statistics
 - Minimum and maximum gray-level value
 - Average, variance and standard deviation
 - Histogram computation and analysis
 - Image focus

Noise reduction and estimation

- Spatial noise reduction
Convolution
Median filters
- Temporal noise reduction
Recursive average
Moving average
Average
- Noise estimation
Root-mean-square noise
Signal-to-noise ratio

Operation on interfaced video frames

- Elimination of the interlaced images artifacts by rebuilding or re-aligning fields

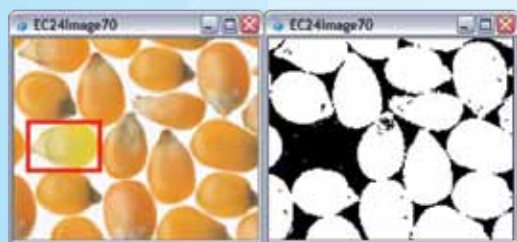
Feature point detectors

- Harris corner detector
- Canny edge detector

Other operations

- Overlay
- Scalar gradient





EasyColor™

Color Image Analysis Library

Main Features

Fast conversion to 11 color spaces
Color segmentation
Color verification

Typical Applications

Food inspection
Printing
PCB inspection

EasyColor includes a set of optimized color systems transformation functions and color analysis functions. The color systems supported are RGB, XYZ, $L^*a^*b^*$, $L^*u^*v^*$, YUV, YIQ, ISH, LSH, VSH, LCH and YSH. EasyColor provides efficient means to convert images between these systems and to transform color images into gray level images and vice versa.

Operation Principles

Although the RGB (red, green, blue) representation of color images is well suited for color reproduction (it is used by monitors and cameras), many other representations have been designed for various purposes. More particularly, the "Intensity/Saturation/Hue" color systems are well suited for machine vision applications. EasyColor supports several of them. They separate the achromatic (black and white) component (Intensity) from the chromatic components (Saturation and Hue) which are used to describe colors. This allows a more intuitive interpretation of colors and is very useful to segment colors while eliminating lighting effects. It is thus required, when doing color image processing, to convert the RGB images coming from the camera to another color space, such as LSH, ISH or YSH. EasyColor provides a set of optimized color space conversion functions.

Also included in EasyColor are traditional color image processing functions (such as Bayer pattern conversion and color balance correction), as well as powerful color analysis functions, which allow the user to detect and classify color objects and defects. For example, color image segmentation allows you to decompose a color image in different regions by assigning a class to every pixel. Color image segmentation can be used in conjunction with EasyObject to perform blob analysis on the segmented regions. It is also possible to filter pixels by selecting ranges of values for each component, for example, selecting "olive green" pixels based on their hue only, with a loose discrimination on the intensity and saturation to eliminate surface and lighting effects.

Functions

Color transformations

- Lookup Tables (LUTs)
- LUT for specific usage
 - Colorimetric systems conversion*
 - LUT for gain / offset (color)*
 - LUT for color calibration*
 - LUT for color balance:*
 - gamma pre-compensation, white balance*

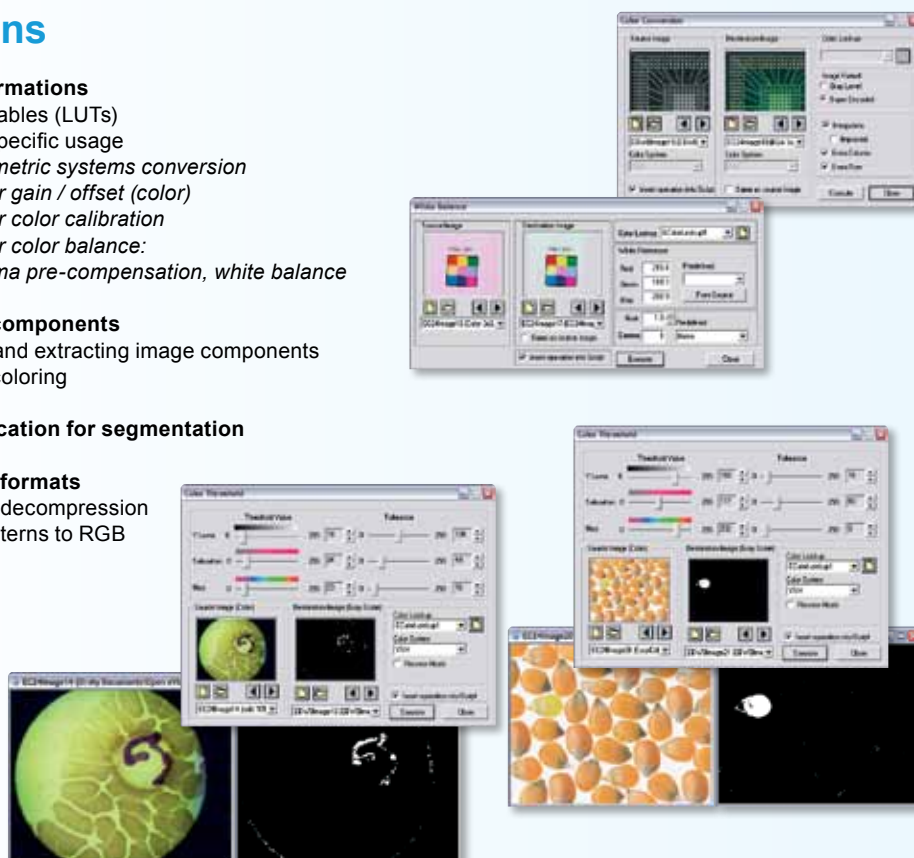
Color image components

- Merging and extracting image components
- Pseudo-coloring

Color classification for segmentation

Special color formats

- YUV 422 decompression
- Bayer patterns to RGB





EasyObject™

Blob Analysis Library

Main Features

Image segmentation
Object labeling
Geometric feature extraction
Flexible Masks
High performance, especially for large images and images with numerous objects

Typical Applications

Surface inspection
Packaging inspection
Object location



The EasyObject library handles image segmentation, i.e. the decomposition of images into separate objects, also called blobs. Once the objects have been constructed, they can be handled as independent entities. Various geometric parameters or features, such as area, width, or ellipse of inertia, can be computed on them. Then the objects of interest can be selected by means of their position or of their computed features. EasyObject also supports the inspection of holes in defined objects. Holes are managed as the objects themselves, benefiting from the same geometrical features. The EasyObject library manages the relationship between objects and holes, defining parent objects for holes.

Flexible Masks

EasyObject supports the restriction of the blob analysis to complex- or disconnected-shape regions of the image thanks to the Flexible Masks that are available for encoding functions. EasyImage can also generate Flexible Masks from an encoded image.

Refactoring globally improving the execution time, especially for large images and images with numerous objects.

Object-Oriented API

EasyObject is accessible through a **brand-new object oriented API** which brings several majors improvements to the library:

- Separate classes according to the different concepts such as encoding, object feature extraction, object selection
- Improved access to the features of the objects. The objects and the holes can be efficiently accessed randomly (i.e. in an index-based fashion)

Functions

Image encoding

- Construction of the runs

Segmentation

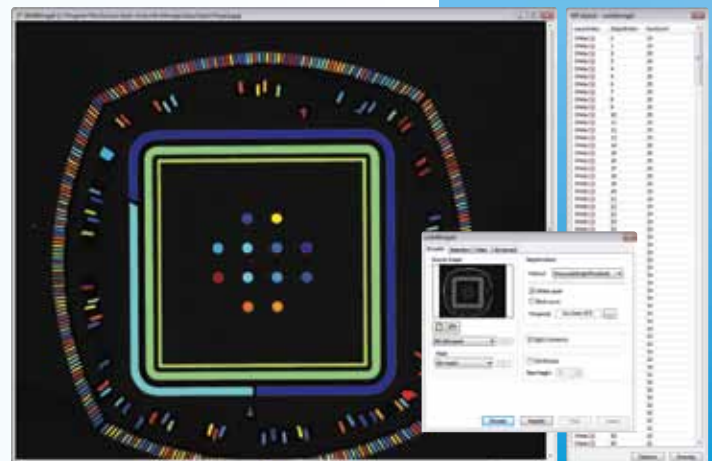
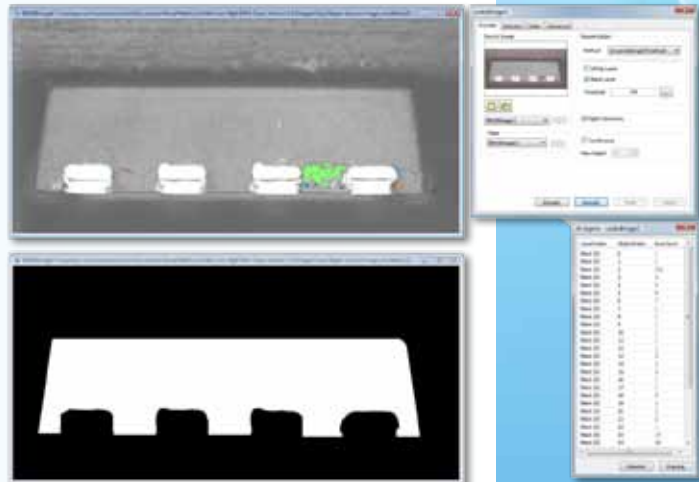
Grayscale single threshold
Grayscale double threshold
Color single threshold
Color range threshold
Reference image
Image range
Labeled image
Binary image

Pixel aggregation

- Object construction: aggregation of the runs into objects
- Hole construction: aggregation of the runs into holes
- Continuous mode for web inspection applications using line-scan cameras

Object feature extraction: geometric parameters computation

Object selection and sorting according to any feature value



Increased performances for images with numerous objects



Blob Features

Computable Features

Position

- Limit (top, bottom, left, right)
- Gravity center (X and Y)
- Weight gravity center (X and Y)

Extents

- Area (pixel count)
- Feret box (center X and Y, height, width with distinct orientation angles at 22, 45, 68 degrees) and Bounding box (center X and Y, height, width)
- Minimum enclosing rectangle (angle, center X and Y, height, width)

Miscellaneous

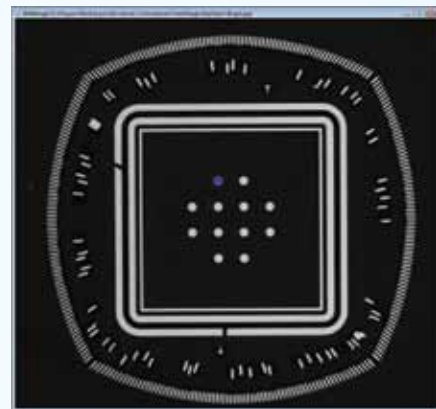
- Starting point of the object contour (X and Y)
- Largest run
- Run count
- Object number (index)

Statistics

- Pixel gray-level value (average, deviation, variance)
- Pixel gray-level value (min and max)

Ellipse of Inertia

- Eccentricity of the ellipse of inertia
- Ellipse
- Second order geometric moments

[illegible]

Convex Hull

The convex hull of a shape is the convex polygon of minimum area that completely surrounds an object. The convex hull can be used to characterize the object footprint, as well as to observe concavities.

Graphic Representation

The objects can be drawn onto the source image.

The following blob features have a pre-set graphical representation:

- Objects
- Diagonals
- Bounding box
- Convex hull
- Ellipse
- Feret Box
- Feret box with an angle of 22°
- Feret box with an angle of 45°
- Feret box with an angle of 68°
- Gravity center
- Minimum enclosing rectangle
- Weighted gravity center



EasyMatch™

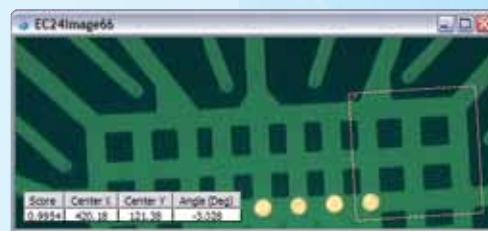
Pattern Matching Library

Main Features

Normalized correlation method
Sub-pixel accuracy
Rotation and scaling support
Multiple pattern occurrences
Gray-level and color images support
Non-square pixels management
Don't care areas

Typical Applications

Presence, absence
Alignment
Pick and place



EasyMatch is a gray-level and color pattern matching library. It lets you train the system on a reference pattern and afterwards locate its occurrences in other images. This tool is very convenient when the position of a given part is unknown in the field of view, or if the presence of parts must be controlled. The library works by using normalized correlation method, i.e. measuring discrepancies between the pattern and the target image.

Features

Multiple pattern occurrences

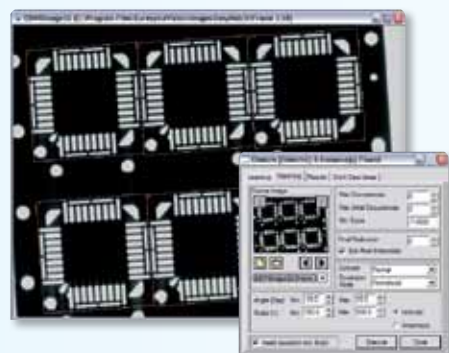
Several occurrences of a pattern, up to a user-defined number, are returned. Only the reliable ones are retained.

Standard, offset-normalized, gain-normalized and fully normalized correlation

The correlation is computed on continuous tone values (as opposed to binary). It is well known that when the lighting conditions vary, as it is often the case, straight comparison of the pattern and image behaves badly. To cope with this, automatically adjusting the contrast and/or intensity of the pattern before comparison is very effective. This process is known as normalization. EasyMatch provides four distinct normalization modes, depending on whether a gain and/or offset compensation is used.

Normal, inverse or mixed contrast

Because of particular lighting effects, an object can appear with inverted contrast (white on black instead of black on white or conversely). Depending on the application, it can be useful to keep inverted instances or to disregard them. Three contrast modes are available: consider positive occurrences only, negative occurrences only or both.



Translation, rotation and isotropic/anisotropic scaling

To find the best matches between the pattern and target image, the target is allowed to translate horizontally and vertically. Additionally, it can be allowed to rotate and/or to change its scale in the X and Y directions simultaneously or independently. The rotation angle and scale factors vary in a user-specified interval. All degrees of freedom can be combined at will.

Variable accuracy, up to sub-pixel level

The accuracy with which the pattern is measured can be chosen (the less accurate, the faster). A one tenth-of-a-pixel accuracy can be achieved.

Don't care pixels

When the pattern cannot be inscribed in a rectangular ROI, the surrounding of the pattern can be ignored by setting the pixels values below a threshold level. These pixels will not take part in the matching process. The same feature can be used if parts of the template change from sample to sample.

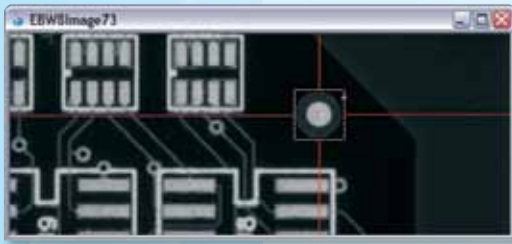
Gray-scale and color images

EasyMatch processes 8-bit gray-scale images as well as 24-bit RGB images.

Non-square pixels

When images are acquired with non-square pixels, rotated objects appear skewed. Taking the pixel aspect ratio into account can compensate for this effect.





EasyFind™

Geometric Pattern Matching Library

Main Features

- Feature point technology
- Fully automatic, fast and robust
- Rotation and scaling invariant
- High tolerance to pattern degradation
- Don't care areas
- User-defined pivot point

Typical Applications

- Presence, absence
- Alignment
- Pick and place
- Printing industry

Based on an innovative feature-point technology, EasyFind is designed to rapidly find one or more instances of a reference model in the image. Compared to classical algorithms, EasyFind features faster processing and improved robustness. Euresys' geometric pattern finder shows excellent performances when handling instances that are highly degraded due to noise, blur, occlusion, missing parts or unstable illumination conditions. With an adjustable accuracy up to sub-pixel level, EasyFind reports very precise information about the instances found, such as their location, rotation angle, scale and matching score. EasyFind supports don't care areas. This feature allows the creation of complex pattern shapes.

Fast Processing and Improved Robustness

EasyFind is based on a novel feature-point technology. Instead of comparing the reference model to the sample image pixel-wise, it carefully selects salient features in the model. This method allows EasyFind to match only the areas that convey valuable information, resulting in faster processing and much improved robustness.

EasyFind also brings a new approach to the problem of detecting insufficiently defined models in an image by proposing three selectable pattern types:

Consistent edges

This mode is used for patterns with well defined edges or to find non deformed instances. It detects instances highly degraded due to blur, noise, occlusion or varying illumination conditions.

A **point by point scoring method** makes this operating mode more resilient to large occlusions and/or large variations of contrast. It also globally reduces the computation time of the finding phase.

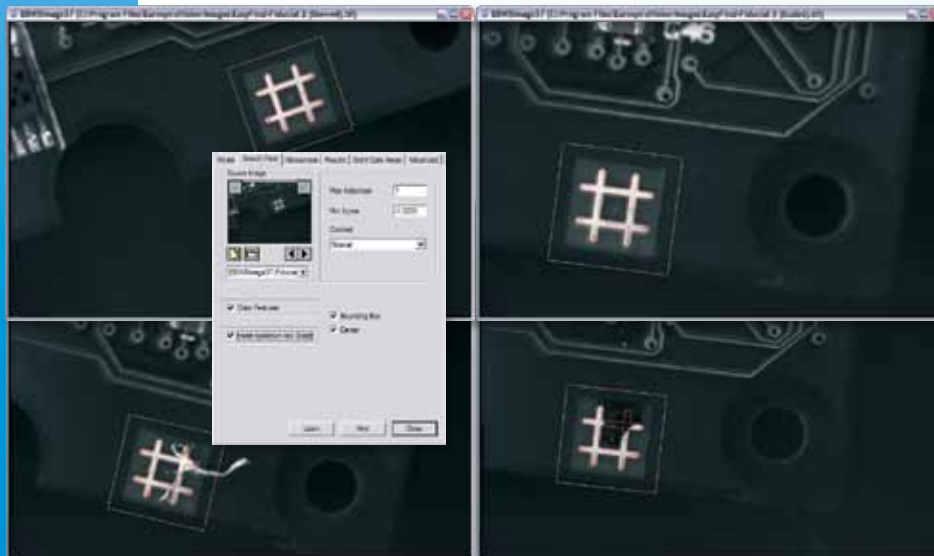
Thin structure

This mode is used to locate patterns including particularly thin structures. It is robust against blur, noise, occlusion and illumination variation.

Contrasting regions

This mode is used for patterns with poorly defined edges or patterns exhibiting noise, blur, and random texture. The contrasting regions pattern type is robust against blur, noise, illumination variation. These three pattern types allow EasyFind to maximize the accuracy and the speed of the processing, even in difficult cases.

These three pattern types allow EasyFind to maximize the accuracy and the speed of the processing, even in difficult cases.





EasyGauge™

Sub-pixel Measurement and Dimension Control Library

Main Features

Sub-pixel point location and edge fitting
Highly accurate and robust
Position, orientation, size, curvature, distances
Advanced and automatic calibration
Multiple gauge models
Graphical model edition

Typical Applications

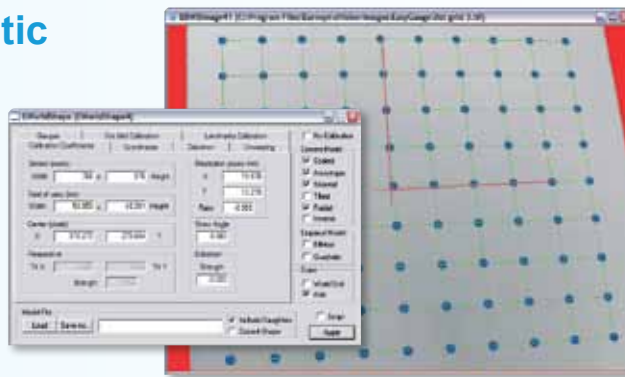
Gauging applications
Calibration metrology
Assembly inspection



EasyGauge is a cutting-edge measurement and dimension control library for use in gauging and metrology applications. By relying on proven sub-pixel edge detection and shape fitting algorithms, it allows determining the dimension, position, curvature, size, angle or diameter of manufactured parts with an excellent accuracy. Robustness is ensured by powerful edge-point selection mechanisms that are intuitive and easy to tune, allowing measurement in cluttered images. In addition to these state-of-the-art features, EasyGauge also supports the automatic measurement of parallel sides, thus providing means of measuring the thickness of flat or bent objects, as well as the precise location of corners.

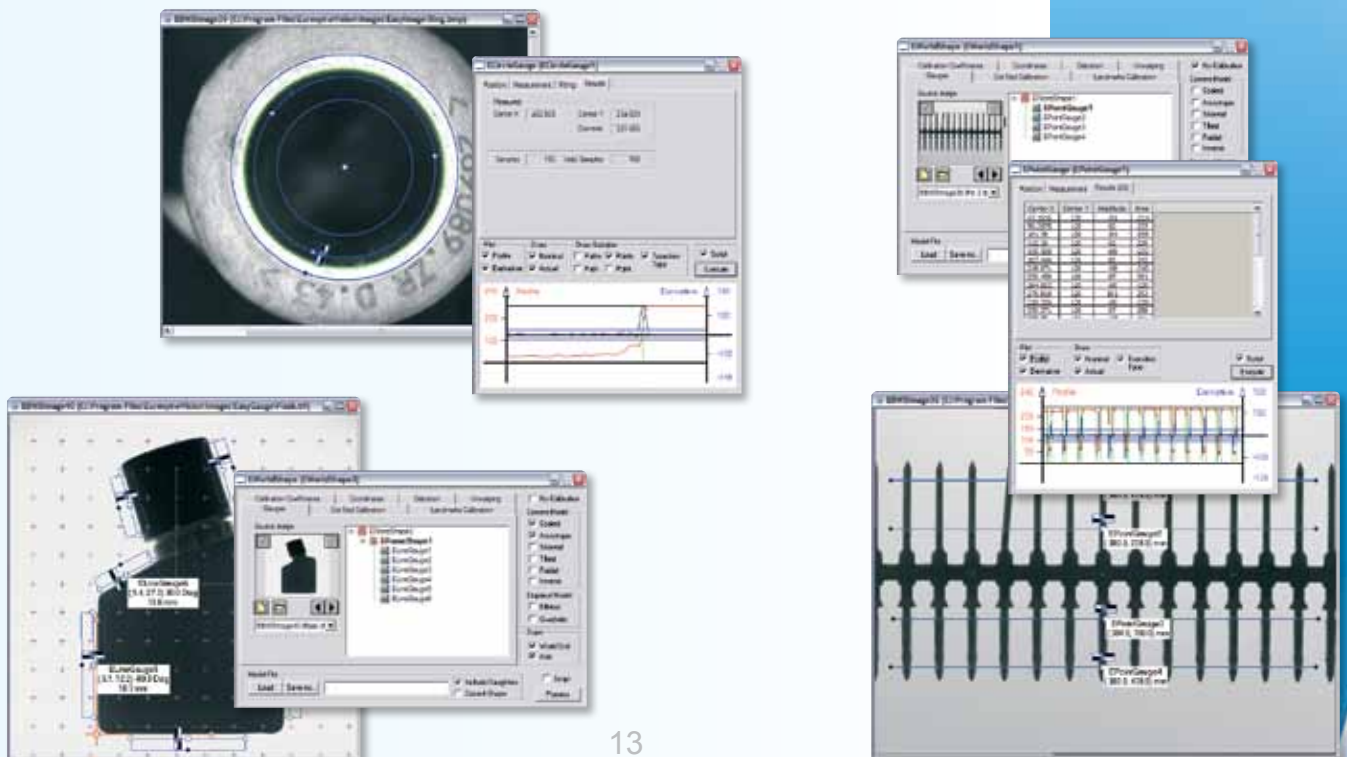
Advanced and Automatic Calibration

EasyGauge has advanced built-in calibration capabilities to transparently convert pixel measurements to physical units; this relieves the user of the need to convert co-ordinates. Non-square pixels and rotated coordinate axis are supported. EasyGauge also provides means to determine and correct perspective and optical distortion, with no performance loss.



Gauge Grouping

EasyGauge supports grouping of the measurement gauges and lets these groups track the measured items in the image. These can freely translate and/or rotate while the probes are repositioned accordingly. Derived measurements such as distances between feature points can then be computed.





EasyOCV™

Optical Character Verification Library

Main Features

- Comprehensive automatic training
- Gray-scale analysis
- Text and character-level inspection
 - Contrast, position, shape defect detection
 - Allowed text translation, rotation, character translation ...
 - Statistical training
 - ...

Typical Applications

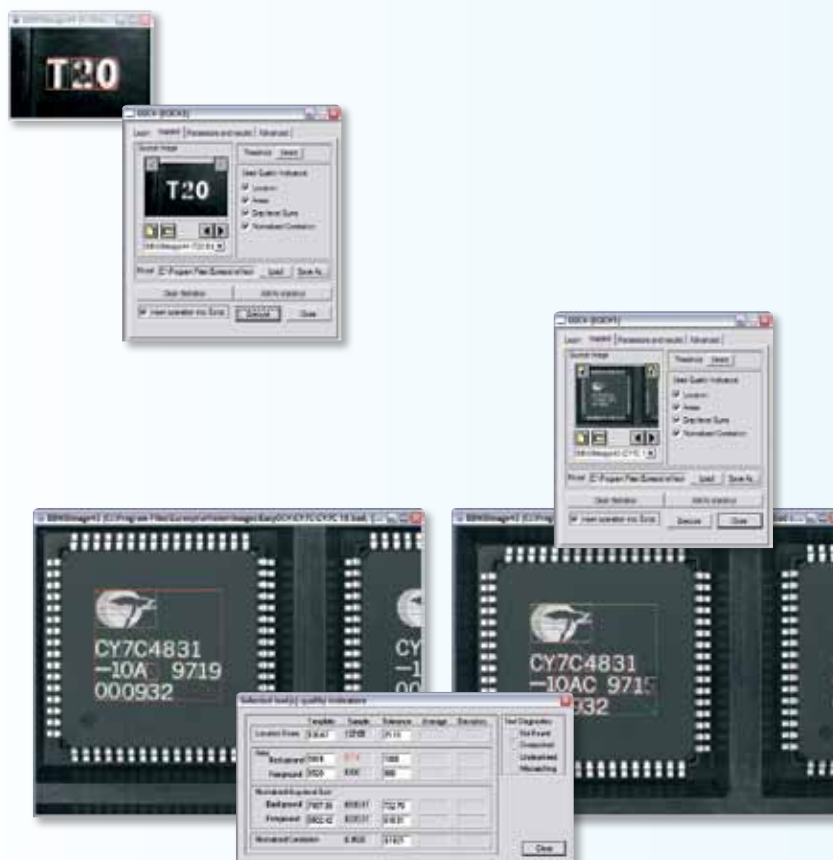
- Mark inspection
- Label inspection
- Lot mixing verification

EasyOCV is an optical character verification tool used for mark inspection. It provides automatic training of the model, adjustable acceptance levels and a robust gray-scale analysis. EasyOCV is suitable for various mark inspection and label printing verification applications. EasyOCV has been designed for on-line verification. It can detect blurred, misaligned, distorted or double marks, extra or missing ink, missing characters or reversed marks as well as contrast problems.

Working Process

EasyOCV first requires training on the particular marking. During this phase, a good quality template is presented to the system. An interactive utility allows defining the structure of the template and related acceptance criteria, in details. The template learnt can be saved for later use.

When a template model is ready, the inspection may take place. The sample image is processed and the system first locates the marking, allowing it to be translated, rotated and re-scaled or even sheared with respect to the template. After location, geometric comparisons are performed and a series of matching scores, called quality indicators, are computed. When these fall outside of given acceptance intervals, a defect warning is reported.





EasyOCR™

Character Recognition Library

Main Features

- Teachable system
- Reliable and robust recognition
- Size invariance
- Trained character fonts
- Broken character reconstruction
- Touching character separation
- Pre-defined fonts

Typical Applications

- Part identification
- Part traceability
- Serial number verification

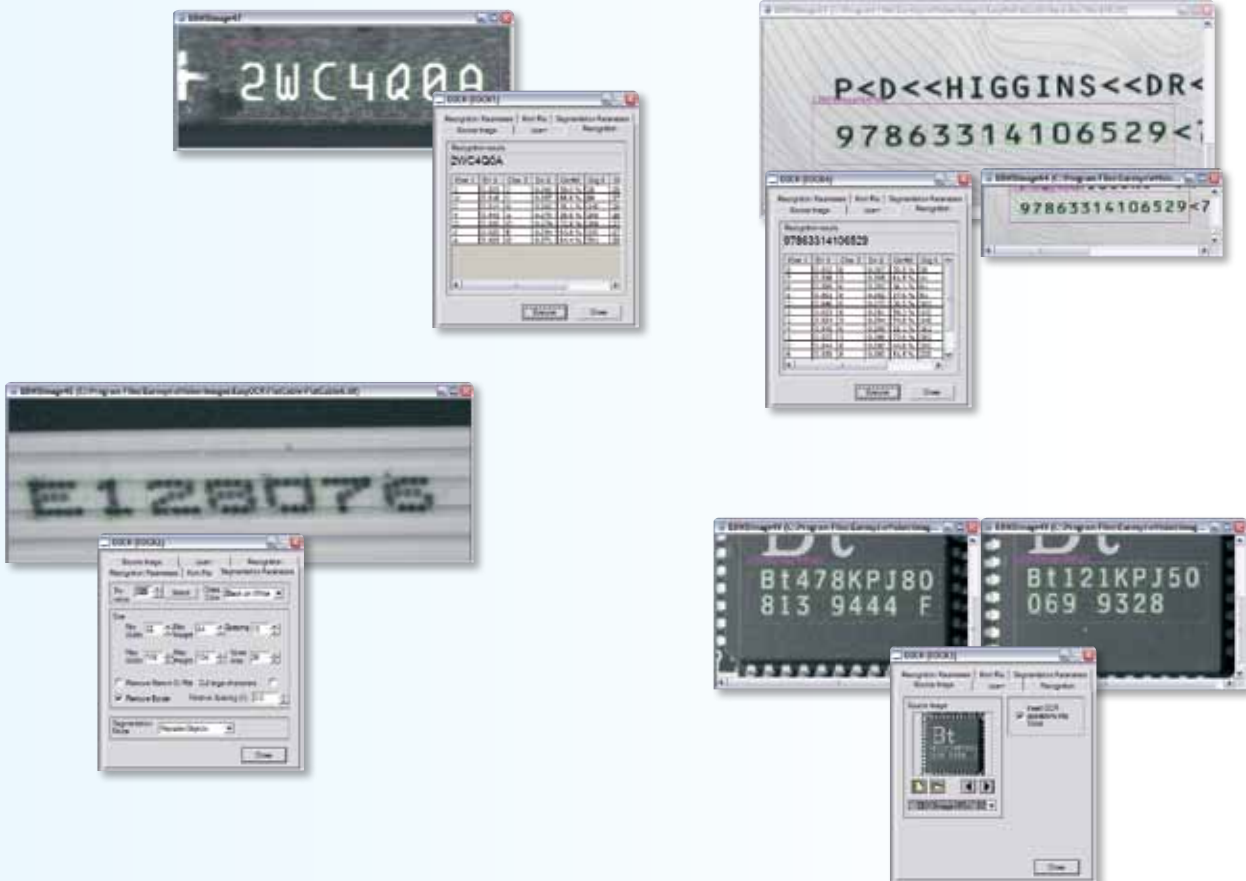
EasyOCR is a font-dependent printed character reader, based on a template matching algorithm. It supports gray level images. EasyOCR allows training on the font to be recognized by showing sample images of all possible characters. For this reason, it is able to read any kind of short text (serial numbers, labels, ...) such as those found in industrial environments.

Working Process

The training phase uses an interactive utility to show samples of the characters and store them in a font file. Moreover, EasyOCR provides the means for you to write your own, custom, font editor.

EasyOCR also provides three standard fonts: OCR-A, OCR-B and Semi. This avoids to collect samples when having to recognize a text using one of these fonts.

EasyOCR uses blob analysis functions to segment the image and extract the characters constituting the text to be read. Blobs are selected as characters based on tunable size and shape criteria. Moreover, EasyOCR is able to deal with characters split into several blobs. When the exact position of the characters in the image is unknown, EasyOCR functions will process the entire image and locate the characters.





EasyBarcode™

Bar Code Reading Library

Main Features

Automatic bar code detection
Very fast and robust
Full support of numerous symbologies

Typical Applications

Product identification
Bar code verification
Part traceability



EasyBarcode is a library designed to automatically locate and read bar codes. Bar codes encode short character string and are widely used for marking and identifying goods. EasyBarcode is able to identify and read a wide range of standard commonly-used symbologies as well as special symbologies. EasyBarcode automatically locates the bar code symbol in the image and supports code rotation. Moreover, for prototyping or special cases, an advanced manual location mode is also available.

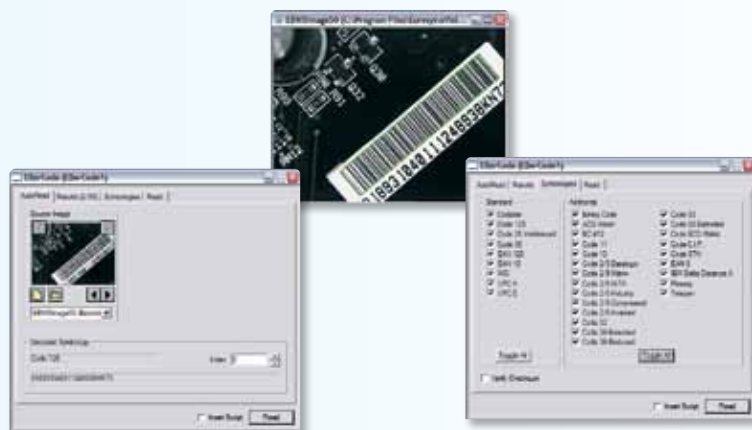
Supported Symbologies

Standard symbologies

Codabar	Code 39	MSI
Code 128	EAN 128	UPC A
Code 25 Interleaved	EAN 13	UPC E

Additional symbologies

Binary Code	Code 32	EAN 8
Code ABC Anker	Code 39 Extended, Reduced	IBM Delta Distance A
Code BC 412	Code 93	Plessey
Code 11	Code 93 Extended	Telepen
Code 25	Code BCD Matrix	
<i>DataLogic, Matrix, IATA,</i>	Code CIP	
<i>Industry, Compressed,</i>	Code STK	
<i>Inverted</i>		





EasyMatrixCode™

2D Data Matrix Code Reading Library

Main Features

Impressive robustness to noise, blur and distortion
Automatic code detection
Very fast operation
Error detection and correction
Rotation and flipping invariant
Scaling up to a minimum size Minimum cell 3X3 pixels
Contrast invariant

Supported codes Data Matrix codes, including ECC200, ECC000, ECC050, ECC080, ECC100 and ECC140 encoding types

Automatic compensation for illumination changes

Typical Applications

Part traceability
Serial number verification



Data Matrix codes are widely used for parcel tracking and part identification in the semiconductor, pharmaceutical and mechanical industries. EasyMatrixCode is a fully automatic reader of 2D Data Matrix codes. It recognizes symbols of any size, contrast, location and orientation in a single operation. EasyMatrixCode supports gray level images. As an automatic library, a learning phase is not required but is an option. In addition, the characteristics of the matrix code may be set manually allowing to restrict the search and thus to accelerate the process. The characteristics are for example: family of the matrix code, number of cells, black cells on white background or reverse, flipping allowed or not. Error detection and correction algorithms are used to provide a reliable reading. EasyMatrixCode is fully compatible with the ANSI/AIM BC11-1997 standard.

Impressive Robustness to Noise, Blur and Distortion

EasyMatrixCode can be used in the most demanding situation. It has been designed to fulfill the most difficult application cases such as:

Bad illumination conditions

- Non uniform contrast
- Under or over exposures

Bad images resulting from printing or optical defects

- Blurred Data Matrix codes
- Anisotropic and non uniform scaling
- Noisy images
- Skewed images

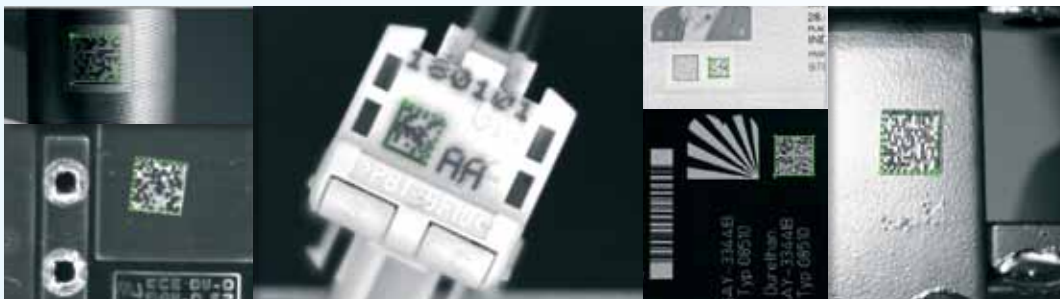
Codes hard to detect

- Small size matrix codes
- Matrix codes on a textured background
- Laser marked
- Nailed
- Rectangular matrix codes



Print Quality Verification

EasyMatrixCode inspects the quality of the printed matrix code. Indicators of the printing quality are defined and graded by the ANSI/AIM standard - International Symbolism Specification; Data Matrix -.





An Open eVision customer is free to choose among a large choice of products the most suitable and attractive offer for his application. All libraries can be purchased individually. Open eVision Bundles group several libraries:

- The **Open eVision Inspection** bundle includes EasyImage, EasyColor, EasyObject, EasyMatch and EasyGauge.
- The **Open eVision Mark Inspection** bundle include EasyOCR, EasyOCV, EasyBarCode and EasyMatrixCode.

The **Open eVision SDK** group the following Open eVision products: Open eVision Studio, EasyImage, EasyColor, EasyObject, EasyMatch, EasyFind, EasyGauge, EasyOCR, EasyOCV, EasyBarCode and EasyMatrixCode.

Open eVision Dongle-Based Licenses

Dongle-Based Licenses offer the flexibility to be transferred from a PC to another. To purchase a Dongle-Based License, select one of the Euresys dongles (USB or Parallel) plus the desired license(s) to be stored on this dongle.

Open eVision for USB Dongle

Libraries

Product Code	Designation
4151	Open EasyImage 1.2 for USB Dongle
4152	Open EasyObject 1.2 for USB Dongle
4153	Open EasyMatch 1.2 for USB Dongle
4154	Open EasyColor 1.2 for USB Dongle
4155	Open EasyOCR 1.2 for USB Dongle
4156	Open EasyOCV 1.2 for USB Dongle
4157	Open EasyMatrixCode 1.2 for USB Dongle
4158	Open EasyFind 1.2 for USB Dongle
4159	Open EasyGauge 1.2 for USB Dongle
4160	Open EasyBarCode 1.2 for USB Dongle

Bundles and SDK

Product Code	Designation
4164	Open Inspection bundle 1.2 for USB Dongle
4165	Open Mark Inspection Bundle 1.2 for USB Dongle
4167	Open Full Bundle 1.2 for USB Dongle
4172	Open eVision SDK 1.2 for USB Dongle

Open eVision Studio

Product Code	Designation
4163	Open eVision Studio 1.2 for USB dongle

Dongle

Product Code	Designation
6512	eVision/Open eVision USB Dongle (empty)

Open eVision for Parallel Dongle

Libraries

Product Code	Designation
4201	Open EasyImage 1.2 for PAR Dongle
4202	Open EasyObject 1.2 for PAR Dongle
4203	Open EasyMatch 1.2 for PAR Dongle
4204	Open EasyColor 1.2 for PAR Dongle
4205	Open EasyOCR 1.2 for PAR Dongle
4206	Open EasyOCV 1.2 for PAR Dongle
4207	Open EasyMatrixCode 1.2 for PAR Dongle
4208	Open EasyFind 1.2 for PAR Dongle
4209	Open EasyGauge 1.2 for PAR Dongle
4210	Open EasyBarCode 1.2 for PAR Dongle

Bundles and SDK

Product Code	Designation
4214	Open Inspection bundle 1.2 for PAR Dongle
4215	Open Mark Inspection Bundle 1.2 for PAR Dongle
4217	Open Full Bundle 1.2 for PAR Dongle
4222	Open eVision SDK 1.2 for PAR Dongle

Open eVision Studio

Product Code	Designation
4213	Open eVision Studio 1.2 for PAR dongle

Dongle

Product Code	Designation
6513	eVision/Open eVision Parallel Dongle (empty)

Open eVision Software-Based Licenses

Software-based licenses do not require any dongle, they are linked to the PC on which they have been activated.

Libraries

Product Code	Designation
4251	Open EasyImage 1.2 for Soft-Based Licensing
4252	Open EasyObject 1.2 for Soft-Based Licensing
4253	Open EasyMatch 1.2 for Soft-Based Licensing
4254	Open EasyColor 1.2 for Soft-Based Licensing
4255	Open EasyOCR 1.2 for Soft-Based Licensing
4256	Open EasyOCV 1.2 for Soft-Based Licensing
4257	Open EasyMatrixCode 1.2 for Soft-Based Licensing
4258	Open EasyFind 1.2 for Soft-Based Licensing
4259	Open EasyGauge 1.2 for Soft-Based Licensing
4250	Open EasyBarCode 1.2 for Soft-Based Licensing

Bundles and SDK

Product Code	Designation
4264	Open Inspection bundle 1.2 for Soft-Based Licensing
4265	Open Mark Inspection Bundle 1.2 for Soft-Based Licensing
4267	Open Full Bundle 1.2 for Soft-Based Licensing

Open eVision Studio

Product Code	Designation
4263	Open eVision Studio 1.2 for Soft-Based Licensing



Free evaluation
of the Open eVision
functionalities

Your distributor