VisionExpert Demo

version 2.0

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Summary:	This document describes the use of VisionExpert demo version.

AUTONOMOUS INSPECTION CELL

INDUSTRIAL ROBOT

VISIONEXPERT

INTELLIGENT CAMERAS

vision systems & robotics

compar

History

Version	Date	Author	Comment
1.0	18.03.2010	TD	Original version
1.1	23.11.2010	LB	Modifications
1.2	03.12.2010	TD	New setup procedure
1.3	20.05.2011	TD	New concept of the demo software with VisionExpert 3.1.4.0
1.4	09.06.2011	TD	- Update with VisionExpert 3.2 - Add the procedure to de-install the demo software
2.0	01.11.2014	TD	-Update with VisionExpert 4.0

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Introduction

Intended readership

This manual was written for people who want to try out the vision module without any other components of VISION*expert*®.

Applicability statement

This Document concerns the Demo Software VISION*expert*®, version 4.0.0.0

Purpose

The document contains all information for installing and using demo version of VisionExpert.

How to use this document

The chapter „**Overview**” offers a general description of the software.

The chapter “**Installation**” explains the procedure to install the demo program.

The chapter “**Start Demo**” shows you how to start the demo program.

The chapter “**What to do**” gives you advices to run the demo properly.

The chapter “**How to create your own project**” describes the way to create your own project with the demo software.

The chapter “**Operations**” lists all operations available in the demo version.

The chapter “**Appendix**” describes the restrictions of the demo program.

Related Documents

VISION*expert*® User Manual, version 4.0

Problem reporting instructions

All problems that occur with the installation or the configuration of the software should be reported to Compar AG.

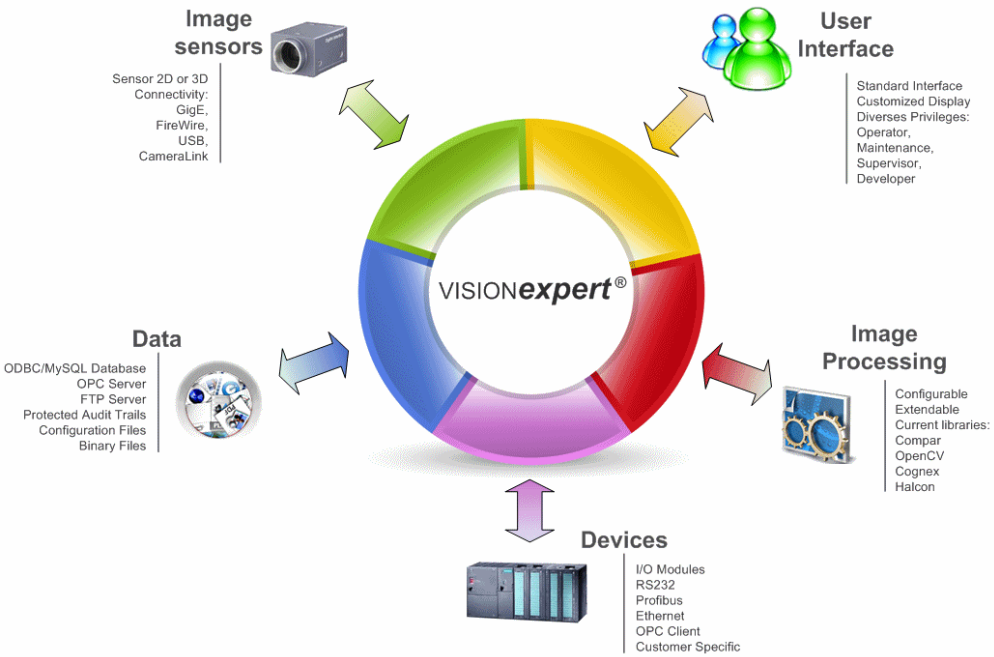
Overview

Architecture

The software VISION*expert*® is designed to create and realize a vision system in a production process. As a comprehensive application it performs the image acquisition, the image analysis as well as the communication with the production machine.

VISION*expert*® functionalities are listed below:

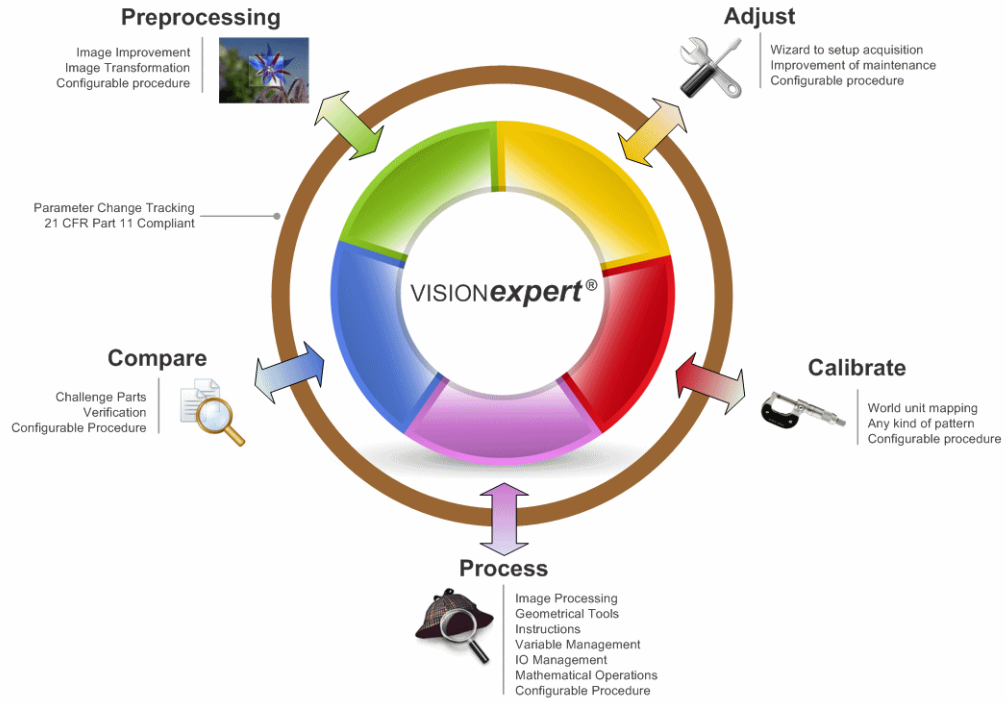
- Resource management of the vision system (camera interface, communication interface).
- Implementation of the machine cycle to interface with the production line.
- Management of multiple modules.
- Implementation of the image processing operations.
- Analysis and optimization of the procedure parameters.
- Assignment of image processing operations to a product.



The purpose of the demo is to allow users to run the image processing module of VISION*expert*® with the user interface as standalone system.

Functionality

The VISION*expert*® component realizes all necessary operations to manage a vision system. These operations are summarized by the figure below:



- **Preprocessing**

performs an image processing procedure to prepare an image before the main analysis

- **Adjust**

offers a wizard to create steps in order to adjust the acquisition station of the vision system.

- **Calibrate**

allows the calibration of the vision system.

- **Process**

performs the main analysis of the vision system.

- **Compare**

helps to verify the consistency of the parameters of a process by using challenge parts.

Operations

For all operations except the “Compare” operation, you can configure an image processing sequence by using the functions of the different types listed below:

- **Image Processing Operations**
  Filters, Blobs, Edge, Pattern Matching, ...
- **Geometrical Tools**
  Point-Point, Line-Point, …
- **Flow Control**
  hierarchical grouping, if statement, loop (for, while), switch..case..default, parallel execution
- **Variable Management**
  List, array, watch, …
- **Mathematical operations**
  Parser, Excel-Spreadsheet
- **User-Interface**
  Graphical tool, message box
- **IO management**
  Image & data file

The complete description of the vision module is given in the VISION***expert***® user manual.

Installation

Description

This chapter describes the installation of VisionExpert Demo.

Requirements

Item	Comment	Version
Standard PC	Minimum 512 MB RAM Intel Processor or compatible Minimum 500 MB Hard Disk	
Operating System	Windows 7 English	32/64bits

Cautions & Warnings

None

Install Procedure

1) Depending on the operating system 32 bits or 64 bits, you should use the corresponding setup program:
32 bits: VisionExpert Setup Demo (x86).exe
64 bits: VisionExpert Setup Demo (x64).exe.

2) Start the correct setup and follow the instructions step by step.

Uninstall Procedure

1) To de-install the VISION***expert***® demo version, you have to open the control panel of Windows.

2) Select “Programs & Features” and select the application “VisionExpert”

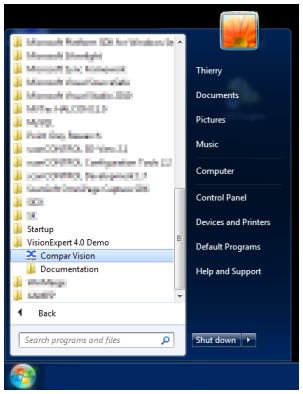
Start Demo

Procedure

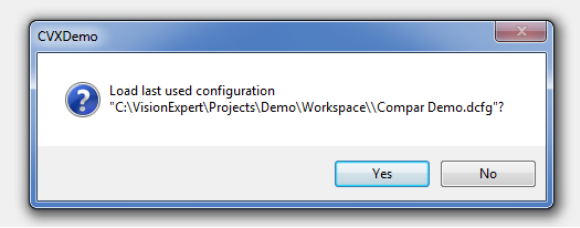
You can start the VISION***expert***® Demo program by selecting the entry:

“**VisionExpert 4.0 Demo/ Compar Vision**”

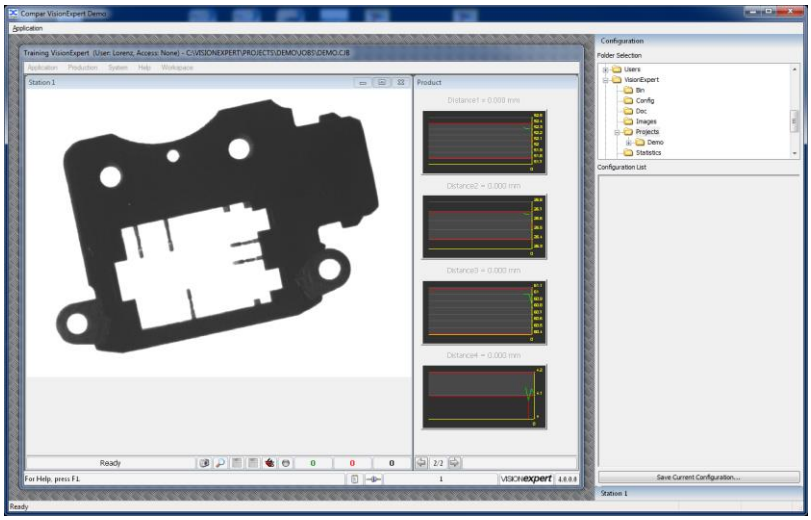
in the “Start/Programs” menu of Windows as shown below:



The first time you will be ask if you want to load the demo project which gives you an overview of the possibility of VISION***expert***®:



By pressing the button <YES>, you will get the following display:

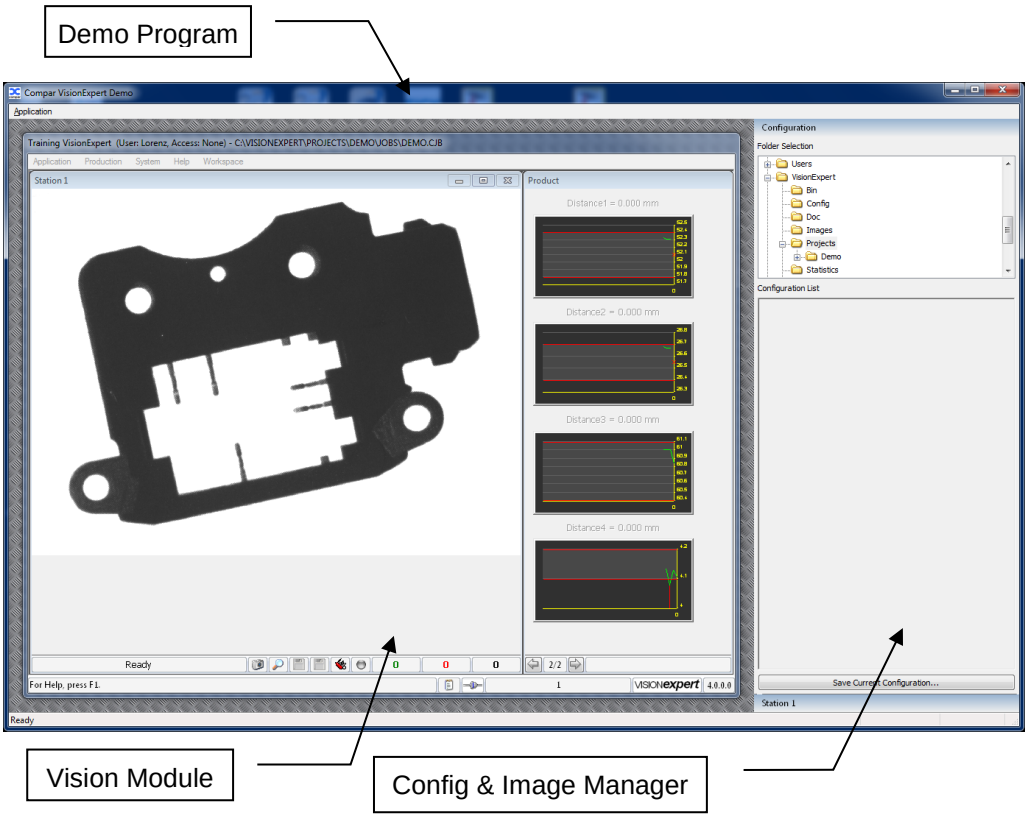


Read the chapter “**What to do**” to run the demo program.

What to do

User Interface

When starting VISION*expert*® Demo, you get a Windows frame looking like this:



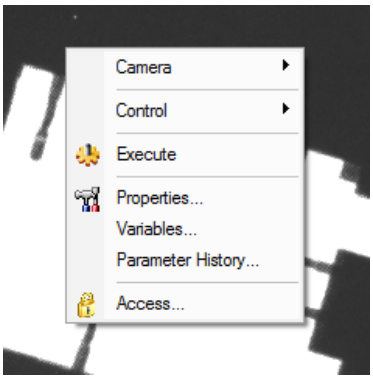
The Demo program contains two main components called:

1. **Vision Module**
   This is the user interface and the image processing module of VISION*expert*®

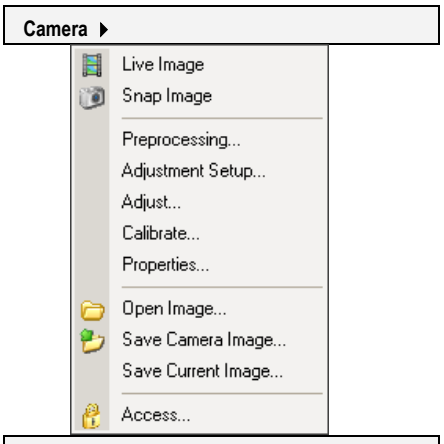
2. **Config & Image Manager**
   It is in charge of managing the configuration files created with the demo program and simulating the image acquisition. It has an integrated browser which allows looking for previous configurations or image files.

When the vision module is in the Off-Line mode, there is a special menu called context menu associated to the station 1.

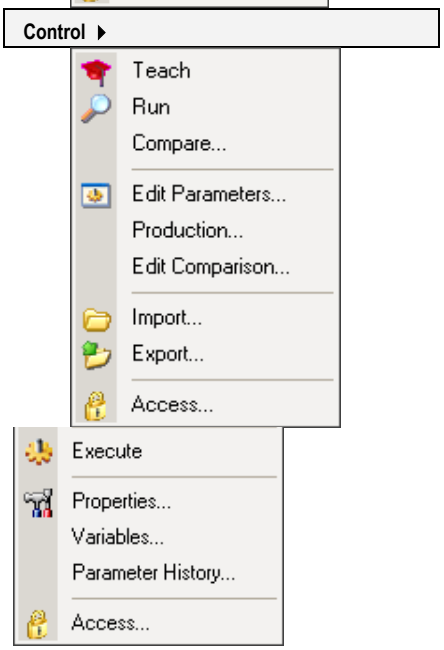
The menu appears by right clicking on the camera image or by typing the hotkeys **F5,** or by pressing the button <Ready> in the status bar.



The menu gives you access to the camera and control options.



Activate and show live camera image.
Snap and show a new single image.
Configure preprocessing of an image.
Configure the adjustment wizard.
Use to adjust the camera.
Use to calibrate (mm / pixel)
Set the camera properties.
Load an image.
Save the actual image.
Save a copy of the actual screen.
Access management of the camera menu.

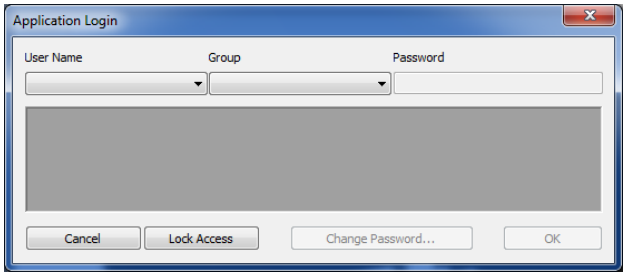


Execute the learning process.
Analyze the current image.
Compare image processing results with expected results.
Open the image processing editor.
Show production counters of the module.
Open the Comparison Editor.
Import image processing operations.
Export image processing operations.
Access management of the control menu.
Snap a new image and analyses it.
Set the module properties.
Display all the existing variables.
Display a history of parameter changes.
Access management of the context menu.

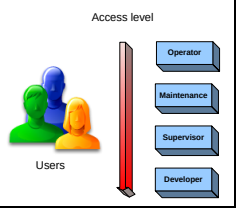
Login

When you want to work with VISION***expert***®, you need first to login in.

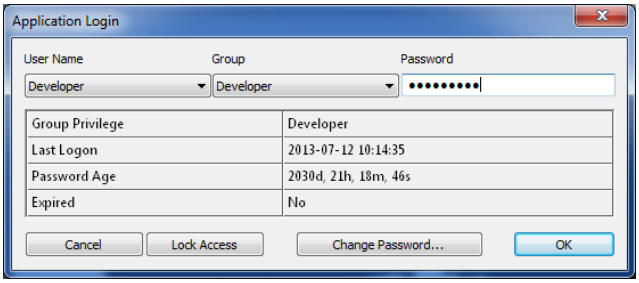
You reach the login dialog by using the menu option <***Application/Login***> of the Vision Module or by pressing the function key <**F2**>. In both cases, the dialog below should appear:



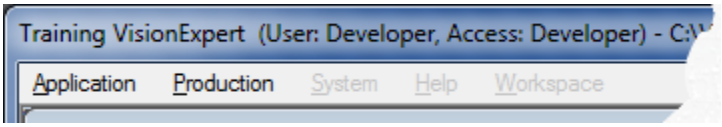
You have to fill three fields: user name, group and password. Per default, the four following users are defined:

User name	Group	Password	Access
Operator	Operator	operator	
Maintenance	Maintenance	maintenance	
Supervisor	Supervisor	supervisor	
Developer	Developer	developer	

Below you see the login dialog with the user name “Developer”, the group “Developer” and his password:



Then you have to press the button <**OK**> to validate your entry. If everything is correct, the new user login is displayed in the title bar of the vision module:



Working modes

The vision module owns two modes of running:

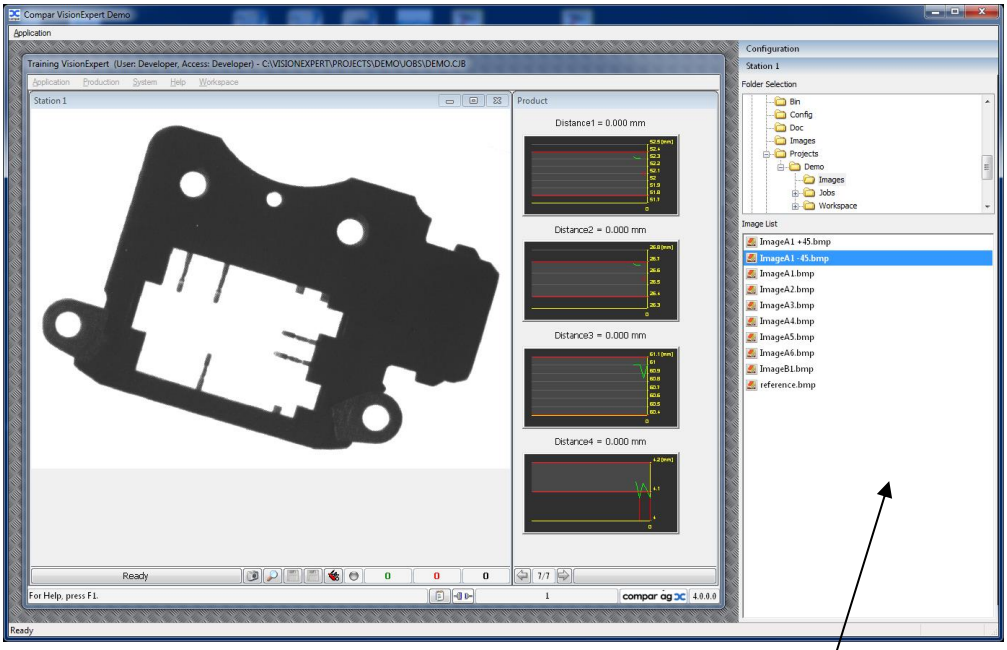
1. **Off-Line Mode**
   This mode allows a user to interact with the vision system.
2. **On-Line Mode**
   This mode locks the access of the vision module which is now driven by a PLC.

To switch between those two modes, you have to use the menu option <***Production/Start-Stop***>, or the function key <**F3**>. To see which mode is active, look at the small connector in the status bar below:

Symbol	Description
	Connected to PLC Interface (started) / stop on click.
	Disconnected from PLC Interface (stopped) / start on click

Acquire an image

If you load the demo project, you can quickly acquire an image by pressing on the icon  in the status bar just under the image or selecting in the context menu the option <***Camera/Snap***>. The “Station 1” tab in the manager module shows the list of the current images configured.



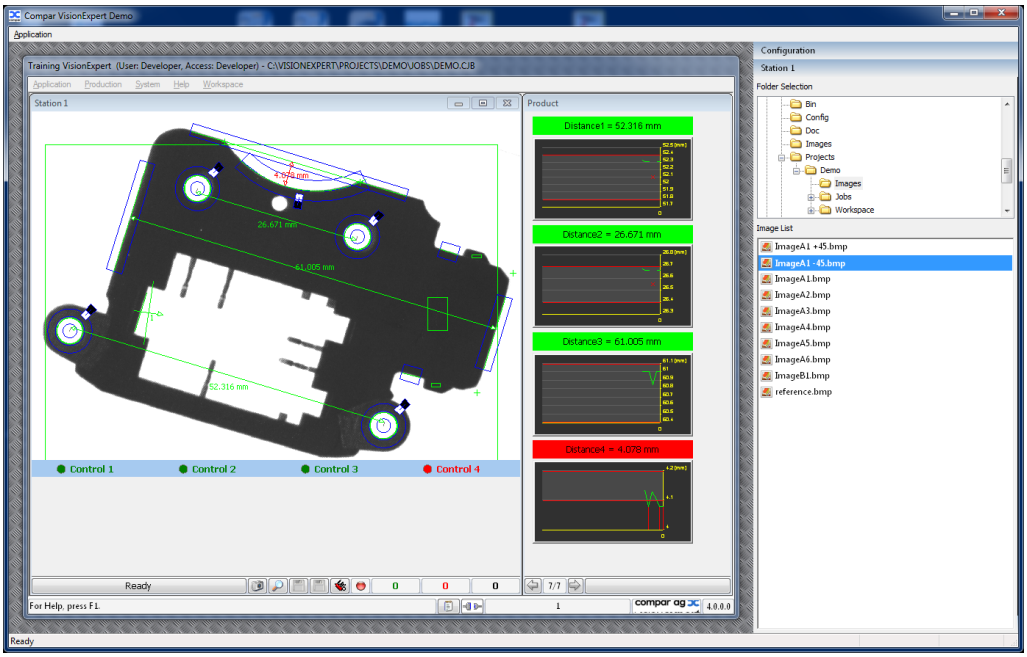
“Station1“ tab with the current list of images

Every time you press the acquire icon, the next image is loaded. When you load the last image, the next one will be the first one.

If you want to load other images, use the folder selection to search on your computer. Then you open the contents of the folder by double-clicking on it.

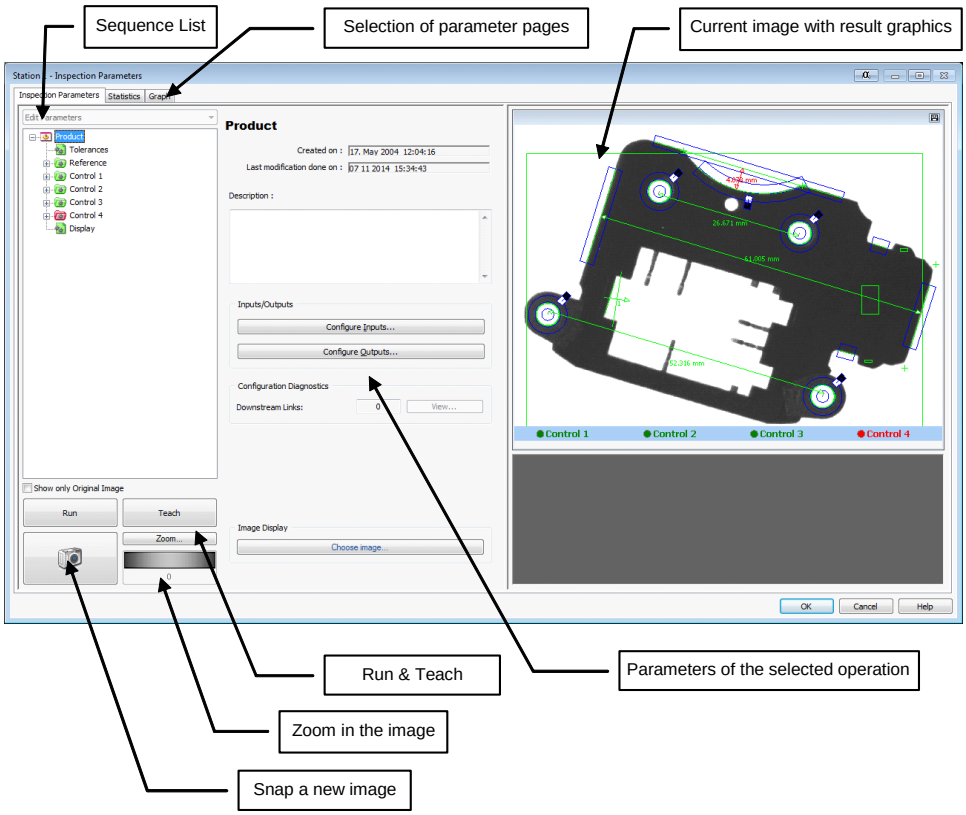
Analyse an image

If you load the demo project, you can perform an analysis by pressing the icon  in the status bar just under the image or by selecting in the context menu the option <***Control/Run***>. The results of the analysis are shown in the image and in the result view on the right side.



Edit a sequence

If you load the demo project, you can edit the image processing sequence by selecting in the context menu the option <***Control/Edit parameters***> or by using the key combination **SHIFT** + <**F5**>. The editor dialog will show up:



By selecting an operation in the sequence list, the parameter dialog will change in consequence.

In order to add, insert or delete an operation, you should report to the chapter "**Control management**" of the user manual.

The operations currently available in the demo program are listed in the chapter "**Operations**" in this document.

Preprocessing, Adjust, Calibrate, Compare

All of these functions are explained in the VISION***expert***® User Manual. In the project "**Demo**", we configured them in order to give you an example.

The image "**Reference.bmp**" should be used for the Adjust & Calibrate functions.

How to create your own project

Introduction

After playing with the demo project, you might be interesting to create your own project. This chapter will explain you how to do it in a simple manner.

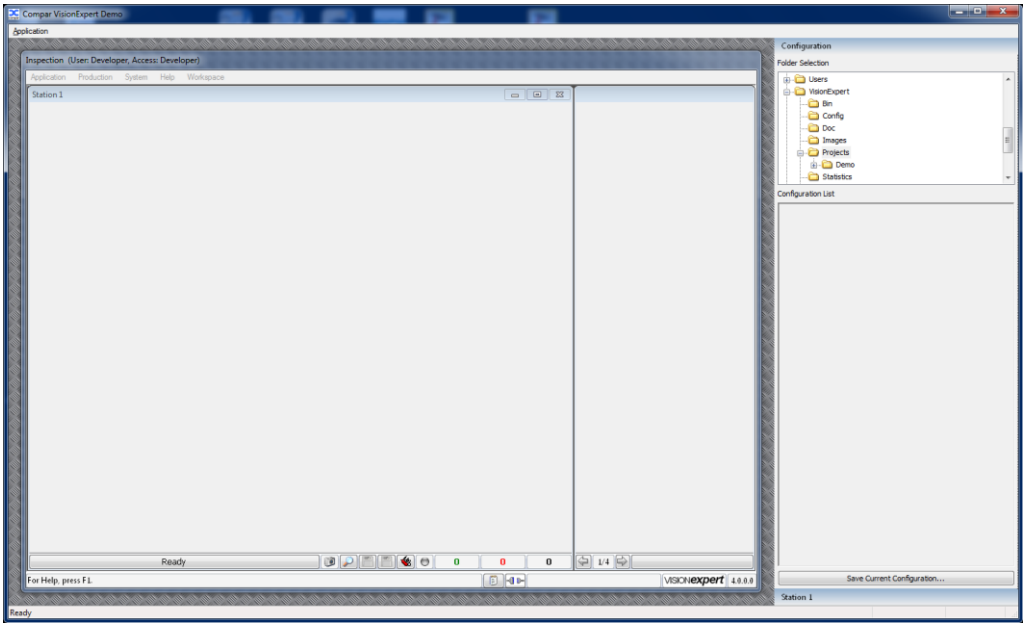
Create a new workspace

When starting the demo program, do not load a previous configuration in order to get an empty workspace.

Without workspace, the demo program will be immediately in the Off-line mode.

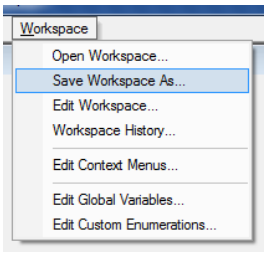
You just need to login as Developer in order to configure the application.

The user interface should look like this:

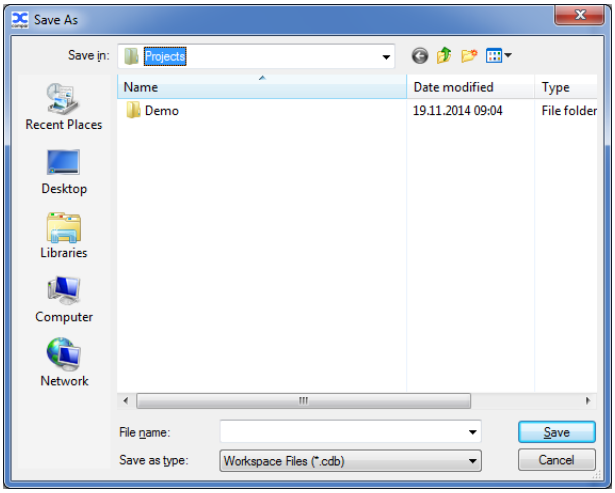


Save workspace

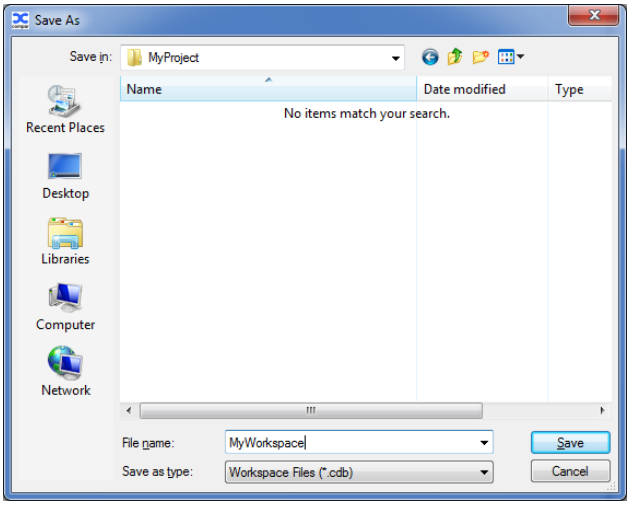
Then you go to the option <***Workspace/Save Workspace As…***> in the main menu.



The “Save As” dialog is opened:



We suggest that you create a new folder in the directory “**C:\VisionExpert\Projects**”. For our example, we create a folder named “**MyProject**” and we store in it our workspace “**MyWorkspace**”. The “Save As” dialog looks like this:

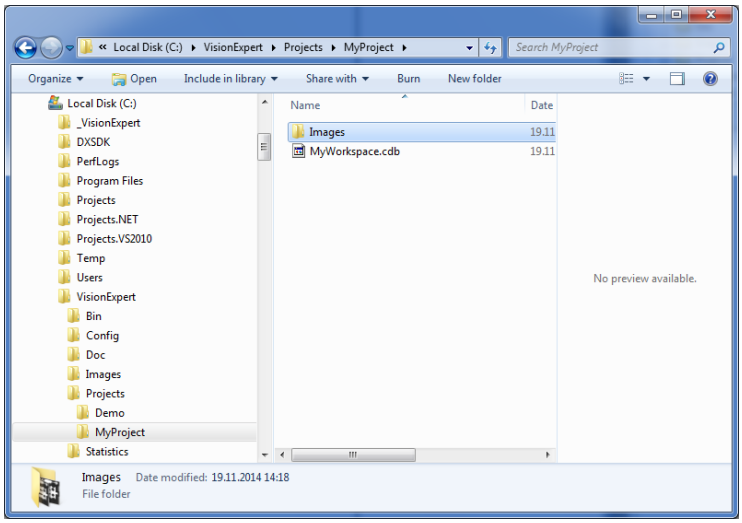


You confirm the saving by pressing the button <**Save**>.

Select images

We suggest that you create a subfolder in your project folder as we did for our project and copy in it the images on which you want to work.

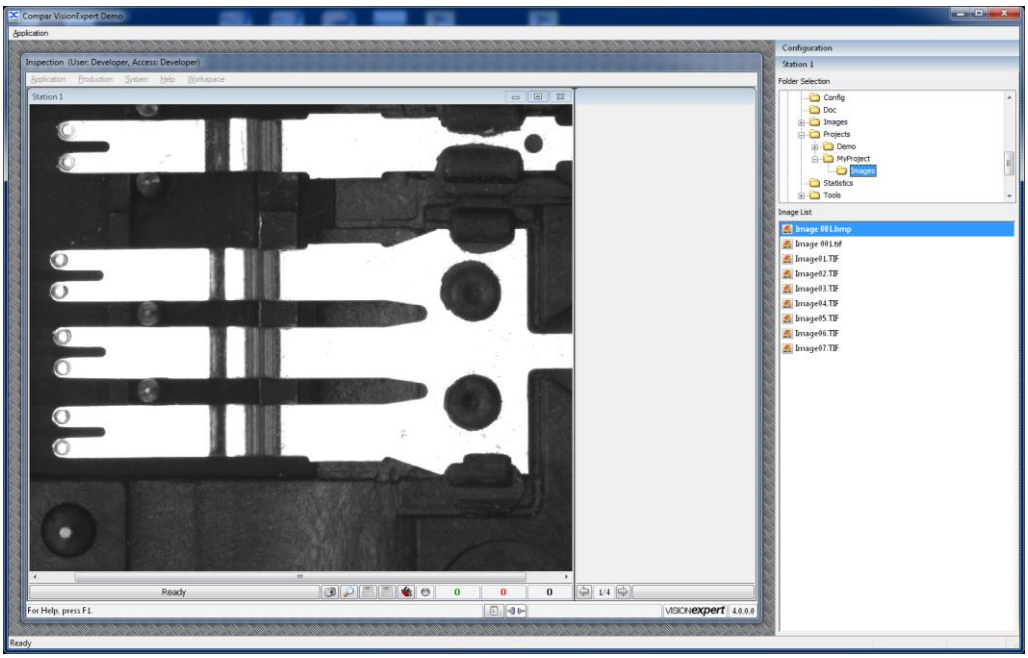
Below you see the subfolder “Images” in our folder “MyProject”.



In this case, you keep the association between the job you will create and the images on which it is applied.

In the demo program, select the “Station 1” tab and use the folder selection to look for your images.

In our example, we select the subfolder “**Images**” in our project “**MyProject**”. After selecting the folder, a double-click on the folder name loads the first image in the list:

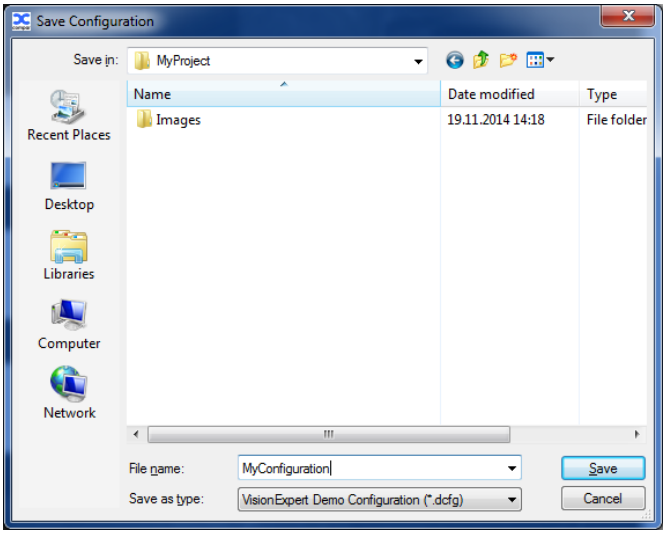


If your folder is not present in the folder list, press <**F5**> to refresh its contents.

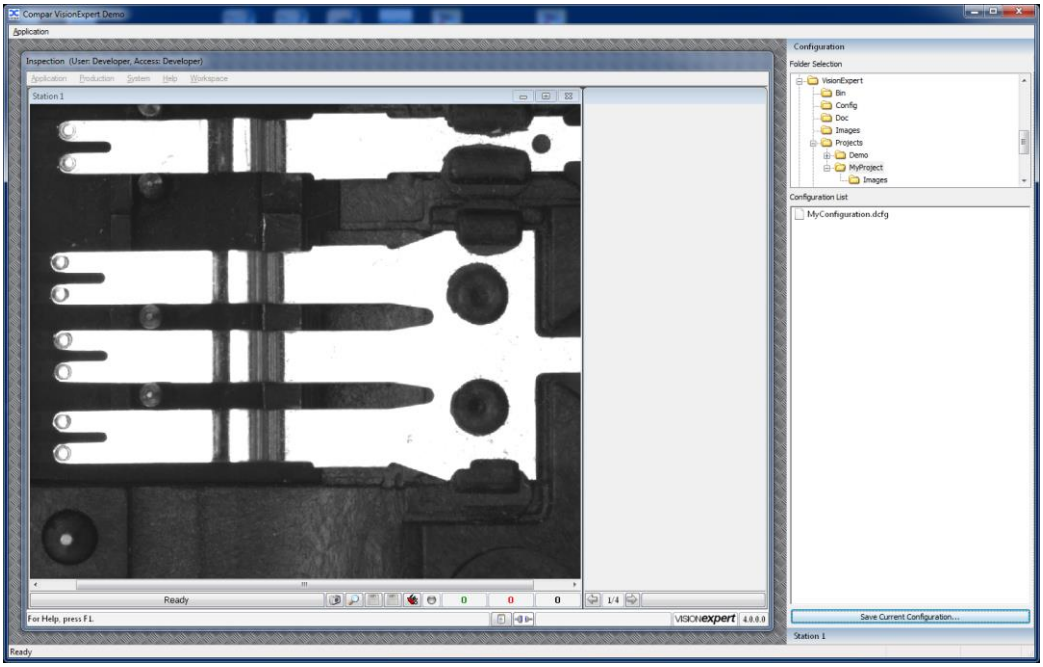
Save a configuration

Before starting to edit a job, you should save your configuration. Select the “Configuration” tab and press the button **<Save Current Configuration>**. A “Save Configuration” dialog shows up.

For our example, we save the configuration in our folder “**MyProject**” and we call it “**MyConfiguration**”. The “Save Configuration” dialog looks like this:



You see in the picture below the configuration file in our project folder.

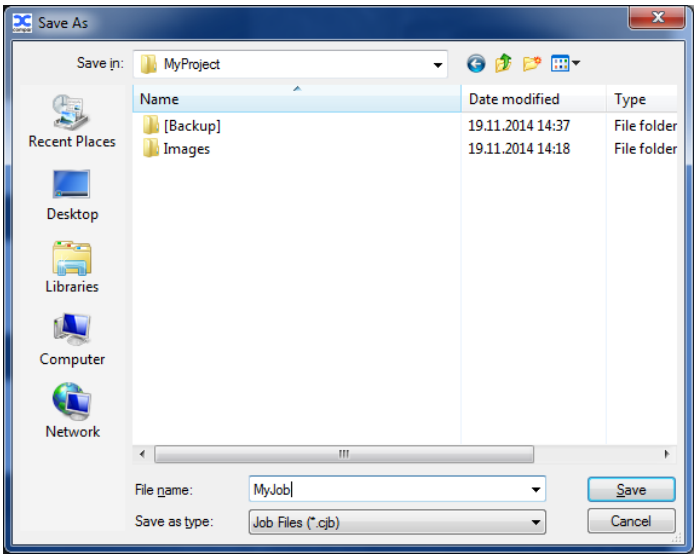


As your configuration is stored, you can load it at any time. After loading, it will load the workspace and the associated images. It is easy in this case to work on several projects.

Creating a job file

The creation of a job file is realised by using the option <***Application / Save As***> in the main menu.

In our example, we create the job file “**MyJob**” in our project folder:



You can go now to the editor to build up the image processing sequence.

IMPORTANT:
The saving of a job file is automatic after confirming a change with the button <**OK**>. If you want to try something on a job, we recommand to make a copy first before editing it. Use the “Save As” option to copy the current contents into a new job.

Operations

Current available

We give you the list of all operations that are available for this demo:

	Operation	Description	Grey	Color
1	**Compar 3D Cone Fit**	This operation fits a cone through 3D data given as a height field image plus calibration data to fit in world space.	BW	-
2	**Compar 3D Renderer**	This operation draws a 3D representation of grayscale image data	BW	-
3	**Compar 3D Undistortion**	This operation undistorts SICK Ranger image data.	BW	-
4	**Compar Array Element**	This operation copies the selected element from a given variable array to its output for further use.	-	-
5	**Compar Bar Code Parser**	This operation verifies a string decoded from a bar code and decomposes it into a list the values it contains according to the chosen format.	-	-
6	**Compar Bayer To RGB**	This operation converts a Bayer encoded grayscale image to RGB color.	BW	C
7	**Compar Bilateral Symmetry**	This operation finds an axis of bilateral symmetry through a given point.	BW	-
8	**Compar Bit Arithmetic**	This operation generates an output word with input Bits and values.	-	-
9	**Compar Blob**	This operation extracts connected component labeling for object segmentation.	BW	-
10	**Compar CSV Reader**	This operation reads tabular data from a text file.	-	-
11	**Compar Color Splitter**	This operation extracts one or more channels from the given color image.	-	C
12	**Compar Color Statistics**	This operation performs different statistical computation over a color image.	-	C
13	**Compar Combine Color Channels**	This operation combines three grayscale images to one color image.	BW	-
14	**Compar Coplanarity**	This operation measures the deviation of an array of 3D points from a reference plane.	-	-
15	**Compar Counter**	This operation increments a value by a user defined step	-	-
16	**Compar Custom Group**	This operation implements a measurement group with a configurable GUI	-	-
17	**Compar DXF Reader**	This operation reads a DXF file and creates a shape list.	-	-

18	**Compar DXF Shape**	This operation presents a single DXF shape as its output.	-	-
19	**Compar DXF Transform**	This operation transforms the coordinates of a shape list.	-	-
20	**Compar Deformation**	This operation gives the point at the center of the outer arc and the line where all circle centers pass. The point of this line must be in the area to be modified.	BW	-
21	**Compar Depth Correction**	This operation corrects the location of the given geometrical objects for their difference in camera distance.	BW	-
22	**Compar Display Elements**	This operation adds an arbitrary number of dynamic display elements to the screen.	-	-
23	**Compar External Process**	This operation calls an external program.	BW	-
24	**Compar False Colors**	This operation maps the gray levels of the input image to arbitrary gray or color values.	BW	-
25	**Compar Function Painter**	This operation uses an arbitrary mathematical formula to generate an artificial image	-	-
26	**Compar Geometrical Transformation**	This operation transforms a point position using geometrical transformations.	-	-
27	**Compar Geometrical Transformation List**	This operation offers a list of geometrical transformations	BW	C
28	**Compar Grayscale Statistics**	This operation performs different statistical computation over the image.	BW	-
29	**Compar IM Transformation**	This operation does different transformations: Autocorrelation, Distance Transformation, Regional Maximum	BW	-
30	**Compar Image <=> Client Coordinate Conversion**	This operation converts coordinates between Image and Client Systems.	-	-
31	**Compar Image Detail**	This operation copies the selected image detail to a new image.	BW	C
32	**Compar Image Information**	This operation extracts the properties of its input image and publishes them for linkage.	BW	C
33	**Compar Image Mask**	This operation creates an image mask to suppress irrelevant image regions.	BW	C
34	**Compar Inline ROI Editor**	This operation allows the interactive ROI definition - offline and online, too.	-	-
35	**Compar Iterator**	This operation iterates its subprocess sequence based on a dynamic list of input objects.	-	-
36	**Compar Load ROI from Disk**	This operation loads an image file from fixed storage	BW	C
37	**Compar Loop Statement**	This operation implements some loop statements we're all used to from C/C++ programming.	-	-
38	**Compar Mathematical Expression Parser**	This operation parses a mathematical formula and evaluates it using the given input values.	-	-
39	**Compar Mathematical Operations**	This operation allows to perform mathematical - logical operations	-	-
40	**Compar Matrix Code Reader**	This operation reads a matrix code.	BW	C

41	**Compar Measure Circle**	This operation performs sub-pixel circle measurement	BW	-
42	**Compar Measure Line**	This operation performs sub-pixel line measurement	BW	-
43	**Compar Measure Pick Position**	This operation determines a list of points which can pick up by a robot based on a list of objects.	-	-
44	**Compar Measure Point**	This operation performs sub-pixel point measurement	BW	-
45	**Compar Measurement Group**	This operation allows the building of a sub-sequence of operations.	-	-
46	**Compar Message Box**	This operation displays a user-defined message box	-	-
47	**Compar Operation Circle / Circle**	This operation computes measurements between two circles.	-	-
48	**Compar Operation Line / Circle**	This operation computes measurements between a line and a circle.	-	-
49	**Compar Operation Line / Line**	This operation computes measurements between two lines.	-	-
50	**Compar Operation Point / Circle**	This operation computes measurements between a point and a circle.	-	-
51	**Compar Operation Point / Line**	This operation computes measurements between a point and a line.	-	-
52	**Compar Operation Point / Plane**	This operation computes measurements between a point and a plane.	-	-
53	**Compar Operation Point / Point**	This operation computes measurements between two points.	-	-
54	**Compar QDAS DFD Reader**	This operation reads a Q-DAS DFD file and creates the associated structure.	-	-
55	**Compar QDAS DFX Writer**	This operation writes a DFX file based on a DFD definition	-	-
56	**Compar Ring Warp**	This operation transforms a ring image into a rectangle image for further processing.	BW	C
57	**Compar Rotate Image**	This operation rotates the images	BW	C
58	**Compar Save ROI to Disk**	This operation allows the saving of a ROI into a file.	BW	C
59	**Compar Save To File**	This operation allows the storage of a collection of values into a text file	-	-
60	**Compar Scale And Rotate**	This operation performs a scaling and/or rotation operation on the input image, producing a transformed output image.	BW	C
61	**Compar Shading Correction**	This operation allows the shading correction of an image based on reference images.	BW	-
62	**Compar Simple Transforms**	This operation performs simple transforms such as mirroring or inversion.	BW	C
63	**Compar Sorter**	This operation sorts a list of objects based on their features.	-	-
64	**Compar Statistic Display**	This operation has several counters and displays a statistic with the counters.	-	-

65	**Compar Statistic List**	This operation manages a list of statistical value trackers.	-	-
66	**Compar String Output List**	This operation formats a string output based on a list of variables.	-	-
67	**Compar Switched Data**	This operation defines a switch statement for setting a set of output variables.	-	-
68	**Compar Switched Execution**	This operation branches execution to one of several subgroups based on a list of conditions and outputs its results for further processing.	-	-
69	**Compar Teach Variables**	This operation memorizes arbitrary values generated in a teach cycle for future reference.	-	-
69	**Compar Texture**	This operation processes different types of images for texture analysis.	BW	-
70	**Compar Thresholding**	This operation segments an image using a single threshold - either manually set or automatically computed.	BW	-
71	**Compar User Defined Event**	This operation throws an event with an arbitrary integral ID through the COM interface.	-	-
72	**Compar Variable Array**	This operation allows the construction of an array of variables.	-	-
73	**Compar Variable Assignment**	This operation copies variable values for cases when a variable link is inappropriate.	-	-
74	**Compar Variable List**	This operation allows the management of a set of variables.	-	-
75	**Compar Variable Watch**	This operation performs statistical monitoring on a given variable.	-	-
76	**FlexFactory Anyfeeder SX Control**	This operation controls the motion and outputs of an Anyfeeder SX device.	BW	-
77	**Database MySQL**	This operation allows the management of a MySQL database.	-	-
78	**OpenCV Alignment**	This operation performs an alignment with scaling and rotation.	BW	-
79	**OpenCV Blob**	This operation extracts contours for object segmentation.	BW	-
80	**OpenCV Color To Grayscale Conversion**	This operation converts a color image to grayscale using the method of your choice.	-	C
81	**OpenCV ComparMatch**	This operation executes a gray-scale matching with rotation using image pyramid.	BW	-
82	**OpenCV Convolution**	This operation performs an arbitrary convolution on the input image.	BW	-
83	**OpenCV Geometric Fitting**	This operation fits a geometric primitive through a set of points	-	-
84	**OpenCV Match**	This operation performs a grays-cale matching without scaling and rotation.	BW	-
85	**OpenCV Operations**	This operation applies an arbitrary sequence of filters.	BW	C

Appendix

Limitations

There are no limitations in the management of an image processing sequence.

The limitations of this program are:

- No possibility to acquire an image from a physical camera
- No possibility to communicate to any PLC.