

Case study

Vision System Traceability in Medical Device Manufacturing Applications

For some industries traceability is key to the success for implementing machine vision.



Industrial Vision Systems Ltd have consciously designed the latest version of IVS to include XML support to allow automated documentation to be created once procedures for automated visual inspection have been finalized.

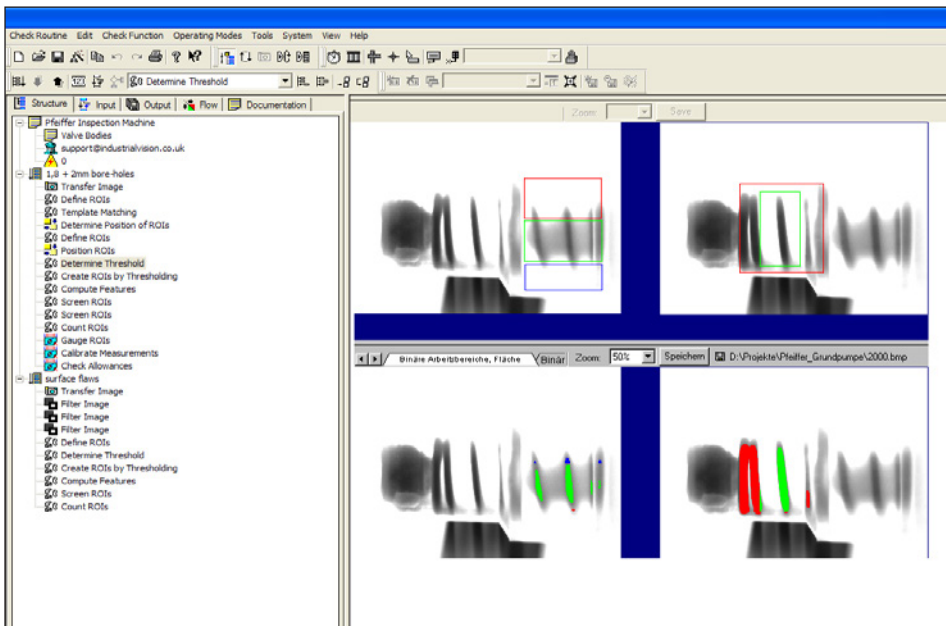
This documentation has been applied for the Pfeiffer company for the examination of pump bodies, similar to those found in nose sprays with

a pumping atomizer. The developed machine for Pfeiffer was integrated by the applications department as a complete solution. The major inspection criteria for the system was the segregation of products against known measurement criteria to control quality of the final products.

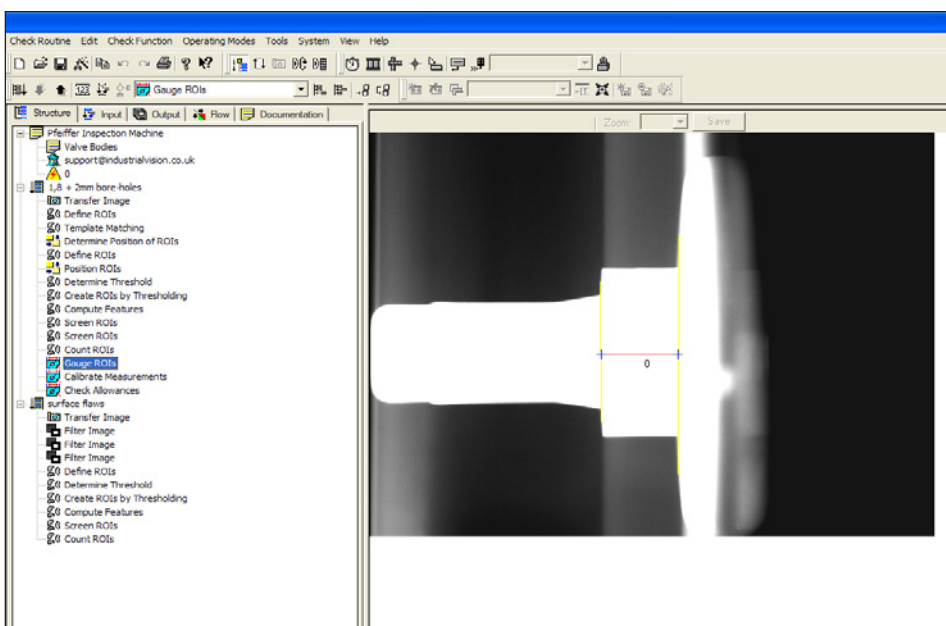
Machine Vision solutions continue to be developed across a wider and more diverse range of markets than ever before. Much of the vision development continues to be driven by the Automotive industry but new areas of application are being opened in the field of pharmaceuticals. Traditional pre-requisites for vision system installation can be applied to all industries, including communication and PLC control of the vision controller, multi tasking of the vision system and documentation of the vision procedure. This last point is clearly more needed in the pharmaceutical industry than any other where precisely defined check routine structures are needed and documented; especially within the constraints of CFR 21/210/211/GAMP validation.



Rotary manufacturing table with vision system



The solution consists of multiple inspection criteria within the IVS check routine. The first check involves examining the intermediate piston stroke length, an indicator for the piston stroke for the pump, in the range of tolerance of $\pm 0.01\text{mm}$. Based on this result a check routine is developed to distinguish between the five pump types available.



The second check involves examination of the transparent plastic body containing the spring and ball of the spray mechanism. Using a template matching function verification of these key components is completed. Typical errors contained in this area include double ball bearings, bent springs, misaligned springs and wrong intermediate piston.

Key to the application is incorporating the machine vision system into the machines cycle time, optimization of the template matching function using the unique automatic wizard meant the image processing could be contained within the necessary performance required.

The complete solution involved the pump bodies being fed on a rotary plate, thus the test position is well defined in terms of positional tolerance. Mounted in a fixed position, external to the carousel area are the 2 off NCG212 1296 x 966 IVS Gigabit Ethernet digital cameras.

Once the pump body reaches the inspection station on the carousel the PLC sends a signal directly to the I/O control within the IVS PC, evaluation by both cameras is completed and communicated back to the PLC within 100msecs. Each feature failure is indicated independently via single I.O. channels. Information is also stored in Excel with information exchanged to the offices via Ethernet connection.

As discussed previously documentation in the pharmaceutical industry is critical and once a complete solution has been finalized within IVS the complete inspection criteria can be automatically stored as an XML document as shown.

This gives detailed information on every check function used and how it was set-up; this makes the whole system very powerful when deploying multiple systems across the pharmaceutical industry; and an ideal solution for Pfeiffer who require this sort of traceability.

The system is now reliably inspecting an annual production of 200 million pumps a year; with the knowledge that the software has been specifically

🔍 Check function (5): Position ROIs

Description of check function
Object-ID: 1006

Configuration of input/output data

List of input data:

Data type:	Image	List of regions of interest
Index of creating check function:	0	4
Data pool index:	0	4

List of output data:

Data type:	List of regions of interest
Index of creating check function:	5
Data pool index:	5

Result output

Status message Status Message Result O.K.: O.K.
 Status message Result not O.K.: n.O.K.
 Status message for target value failure: target value failure

List of parameters:

Parameter name	Value
Rotation around object's center of gravity	Yes
Rotation around prescribed pivot	Yes

🔍 Check function (6): Determine Threshold

Description of check function
Object-ID: 1007

Configuration of input/output data

List of input data:

Data type:	Image	List of regions of interest
Index of creating check function:	0	5
Data pool index:	0	5

List of output data:

Data type:	Histogram
Index of creating check function:	6
Data pool index:	6

Result output

Status message Status Message Result O.K.: O.K.
 Status message Result not O.K.: n.O.K.
 Status message for target value failure: target value failure

designed to handle the detailed requirements the pharmaceutical industry demand.