SCORPION VISION SOFTWARE®

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Scorpion 2D and 3D Robot Vision

Robot vision is one of Scorpion Vision Software's focus areas. Scorpion gives the robot the ability to pick products with high precision in 2D or 3D

Flexible automation means robots, automation and vision working together. This reduces cost and increases the flexibility and possibility to produce several product variants in one production line at the same time - 24 hours a day - with profits. The vision system's ability to locate and identify objects are critical elements in making these systems.

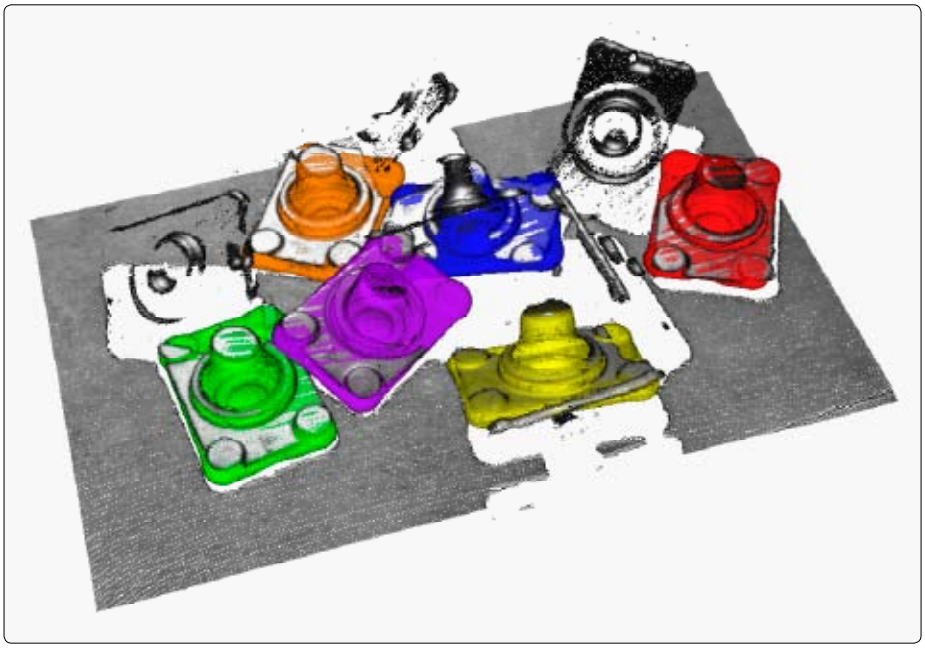
Scorpion Vision Software has been used in robot vision and inspection systems for many years. Scorpion has a complete toolbox of robust and reliable 2D and 3D image processing tools needed for robot vision, gauging and assembly verification. Included is high accuracy and subpixel object location with 3DMaMa and PolygonMatch™ technology making it a perfect companion to World Class Image Components.

Robot Vision

- 2D & 3D Robot Vision
- Robot Guiding
- Part Inspection

Complete Robot Inspection

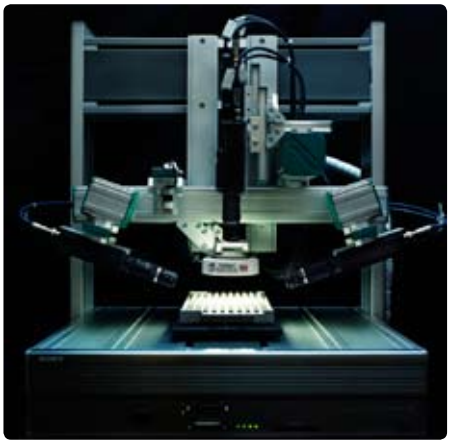
- Zero defects, 100% inspection



Flexible and easy interfacing to standard robots

With Scorpion Vision software it is easy to implement reliable communication with robots from any vendor.
Scorpion is used with robots from ABB, Motoman, Kuka, Fanuc, Kawasaki, Sony and Rexroth Bosch over serial and tcp/ip ports.

3D image for Random Bin Picking



Scorpion Vision Software®, Sony Cast pro II robot and Sony firewire cameras working together.

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Application Areas

Pick & Place Systems

One successful high-precision Scorpion robot vision system was the Pick & Place system for Ericsson's logo to be mounted on a mobile telephone. The system was purchased by Mikron's factory outside Oslo, Norway.

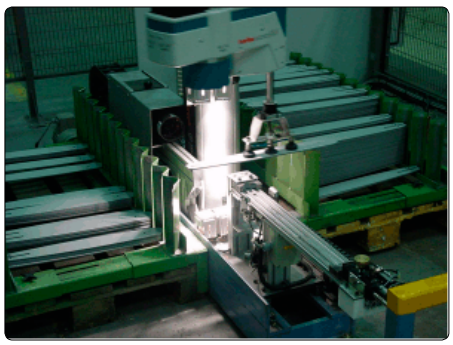
Pick & Place logo application

Robot Vision Inspection

At Electrolux Motor in Sarpsborg, Norway, Scorpion is working together with a Rexroth Bosch Scara Robot.
The system is verifying the gap of a chainsaw sword with a precision of 0.01 mm. More than 400 measurements are performed on each sword.

Each year 1.3 million sword are automatically inspected.

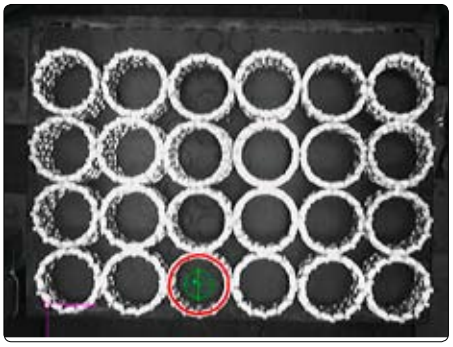
One cycle consists of the following operations: Pick Sword, Present side one to Scorpion, Present side two to Scorpion, Sort swords: Defects are placed on left hand side - Accepted swords are placed on the right hand side of the robot.



Verifying gaps on chainsaw sword.

Picking products from a pallet is easy

Below you see Scorpion picking rings from a pallet. The green cross indicates the center of the ring. The rings are randomly placed on the pallet and the center of the ring is located within a couple of millimeters. The solution is made with Scorpion Premium and a VGA Firewire camera.



Picking rings from a pallet.

3D Robot Vision

Application areas for 3D Machine Vision are
- 3D Robot Vision
- Volume Measurements
- Automotive Part Measurements

Random Bin Picking:
The 3DMaMa™ tool has located 5 parts in 3D, xyz and three angles

The following parameters are calculated in the system above: x,y and z position and corresponding angles and volume: height, depth and width.

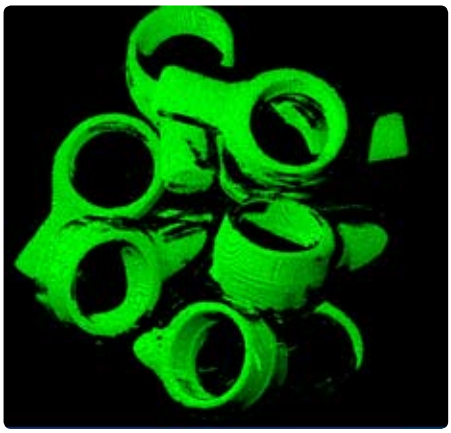
Scorpion 3D can be used with all digital firewire, gigE, USB cameras and the entire range of Sony Smart Cameras.

The most important features and tools are:

- Simple two step 3D camera calibration using ExternalReference3D - our accurate and easy to use 3D camera calibration. This tool is the basis for all 3D tools.
- Full 3D visualization and 3D types in Scorpion including a 3D geometry method set.
- Measuring object size independent of it's position
- 3DMaMa™ - an extremely powerful tool to find multiple objects in a 3D pointcloud
- ChangeReference3D - Moves a 2D plane using the 3D camera calibration. In robot vision this removes the need for multiple plane calibrations.
- Locate3D - Fast and accurate location of objects in space - x,y,z - using one, two, three or four cameras. Clever business logic to remove "bad" points increasing robustness and accuracy. Three and four cameras can be used to extend the volume where the object is located.
- ObjectPosition3D - Easy location of unknown 3D objects by combining information from multiple cameras. The third dimension of an object measured by a pattern matching algorithm.
- MonoPose3D - locates an object in 3D with one camera
- Retrofit 3D Robot Vision onto existing solutions without any hardware change - applies when camera is mounted on the robot

Scorpion is probably the first non-programming 3D camera system available.

3D support is available as an option to all Scorpion versions from Lite to Premium The 3D and 3D advanced options contain more than 50 tools. The options are continuously expanded with more capabilities.



3D image

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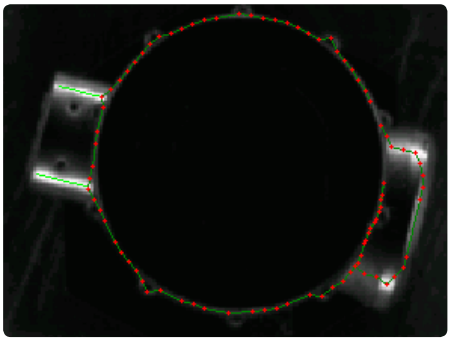
Features

TemplateFinder3 powered with PolygonMatch™ technology Locates Multiple Objects

TemplateFinder3 locates multiple objects with sub-pixel accuracy.

It can handle scaling, translation rotation and perspective. Supporting multiple named templates it can easily be configured to handle automatic product changes.

With the interactive Polygon Model Wizard optimal models describing an object ensures robust and accurate object location.



Optimal model created with Polygon Model Wizard.

Optimal object location with PolygonMatch™ Technology

Scorpion Vision Software's PolygonMatch™ technology ensures sub-pixel resolution independent of rotation, scale and perspective. PolygonMatch™ is an optimal way to locate objects. Multiple polygons define the shape or model of the object. When using the model, the same shapes are extracted from the images and fitted to the original model with the highest possible accuracy.

Firewire imaging ensures superior image quality

Using the high-quality firewire camera XCD-V50(CR) from Sony, the image quality is ensured even when mounting the camera on the robot. The camera is available in two versions: monochrome and color.

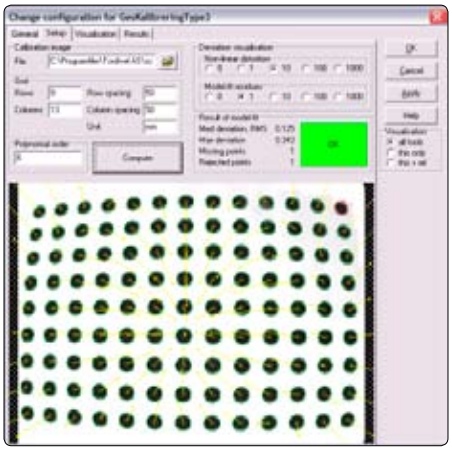
With analog signal transmission, it can be difficult to shield the cable to ensure image quality. Cable length up to 20 meters is supported with standard firewire components.

In complex applications where two or more cameras are needed, these can easily be added to the digital firewire bus at low cost. The Sony firewire cameras XCD-710 and SX-900 are supported when high resolution and high quality is required.

Sony XCD-V50 VGA Firewire Camera

Combining Nth order lens calibration to improve accuracy

Combining four point calibration with 5th order lens calibration improves the precision to a sub-pixel level even with a wide angle lens. Below a typical lens-calibration is shown.



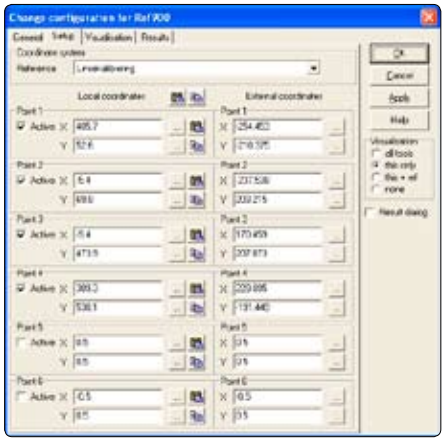
All calibration is performed without any programming.

3D camera calibration

Scorpion uses a simple two step 3D camera calibration. This removes the need for multiple 2D calibrations. When finding objects at different heights, the 2D coordinate systems are dynamically generated.

Easy to use six point robot calibration

Scorpion uses an advanced six point calibration to enable the system always to work in robot coordinates and to detect calibration errors before testing with robot. Multiple coordinates system are supported.

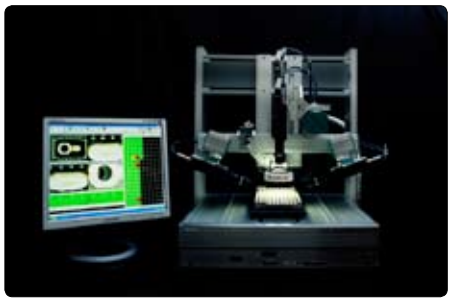


6 point calibration

Supporting Sony Desktop Robots

Sony Scorpion Robot Inspection - 100 % Inspection - Zero Defects in Automotive

Sony Desktop Robot's winning combination of superior performance and compact size is redefining the meaning of production.
The image shows Scorpion inspecting a tray of 180 pressure sensors in six minutes - helping the customer to zero defects and to cut the cost of the alternative manual inspection with a microscope. The robot is equipped with four high quality high performance Sony XCD-710CR digital color cameras.



Scorpion Vision Software®, Sony Cast pro II robot and Sony firewire cameras working together.

The Cast Pro II covers 350 x 350 mm with a precision of 0.02 mm - available in 2,3 and 4 axis version. The smaller Robokid covers an area of 250 x 210 mm.

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Scorpion Vision Software® combined with Sony Smart cameras give world class robot vision solutions.

User Interface

Scorpion has a feature rich, functional and configurable Man Machine Interface with image display, data input pages, web pages, ActiveX containment, .Net support, result panels, image history list, real time trends, logging, event log and quality alarms.

Field Proven and Reliable Image Processing

Scorpion Image Processing is robust, reliable fast and flexible in a non-programming point & click environment with more than 80 powerful vision tools.

Application Specific Configuration Interface

Data Input and custom Graphical User Interface make it fast and easy to implement application specific configuration tailored to each application.

Flexible, robust and powerful result validation and business logic

Using the built in Python Script language, it is easy to do robust result validation, combine geometric knowledge to ensure robust operation.

Multiple Products are easily supported

Scorpion has special features to handle multiple products within one profile. The ExternalDictionary tool automatically switches product configuration when a new product is selected.
The new Toolbox tool makes it easier to copy and reuse structures and business logic from other products.

Mechanics

Profiles are built using standard Montech Profiles.

Scorpion Vision Software® from Tordivel is an independent and open software tool for industrial vision. It is the best choice for the production engineer wanting to save cost, automate or secure quality.

The system gives the user the choice of a small form factor with the Sony SmartCam or the power of a standard PC system.

Scorpion Vision Software is used in a vast variety of industries; automotive, wood, furniture manufacturing, food, pharmaceutical, robotics, packaging, energy and more.

Scorpion Vision Software solves tasks within robot vision, label and surface inspection, assembly verification, quality control, color identification and high precision gauging.

The system is founded on top of a standard Windows 2000 / XP PC platform - thus a flexible alternative to proprietary vision sensors or custom vision systems.

It is cost effective benefitting from the processing power of the Intel processors, low cost and high quality firewire cameras and the possibility of connecting multiple cameras to one PC.
Scorpion Vision Software is packed with features and details making it easy to develop and maintain robust industrial vision systems.

Every single feature is specified, implemented, tested and verified based on experience obtained on the factory floor.

Scorpion Vision Software offers large reduction in the development time and maintenance cost for machine vision systems.

For evaluation, download the complete software and a free demo license valid for 30 days from our web site or ask for a Scorpion CD.

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