

# OptiSCOUT™

## Production

Modular optical recognition system for multifunctional flatbed machines for industrial usage in outline-exactly digital finishing processes

- Production software
- Camera with camera case (optional)
- Job preparation and design software OptiSCOUT Production & Design (optional)



Workflow on Zünd

### Recommended for:

- All applications which need to cut, die cut, laser or mill printed materials outline-exactly
- Zünd and Wild flatbed plotters with/without mill option
- Multifunctional flatbed machines with customized tool heads like Indimco
- All HPGL and G-Code capable machines (Command set with 'read out' command necessary)
- Industrial needs, especially industrial workflows, e. g. Zünd with feeder

### Product Info

OptiSCOUT system consists of a customized software and driver suite and an optional CCD camera. For the installation no hardware intrusion is necessary. The software can recognize printed register marks and material edges independently and compensates linear deviations.

In case of oversized slabs or rolls, where a feed over several job segments is necessary, the segmentation in OptiSCOUT can be done automatically or manually. Thus the OptiSCOUT system extends the possibilities of production machines and increases their productivity.

Before the job is operated the tool head mounted camera locates the position of the register marks which were printed before on strategic positions on the material. The OptiSCOUT correction algorithm compares the current position of the register marks with the ideal position in the original job. Using this data linear deviations <sup>1)</sup> resulting of the print process can be compensated.

Job data are created in a host program (in Fig. 1 CoreIDRAW) and imported, processed and given out in OptiSCOUT Production. It is also compatible with AutoCAD, Adobe Illustrator and Macromedia Freehand. Import formats can be bitmaps, such as tif, gif, jpg, or vector formats like dxf, hpql, eps, ps or ai.

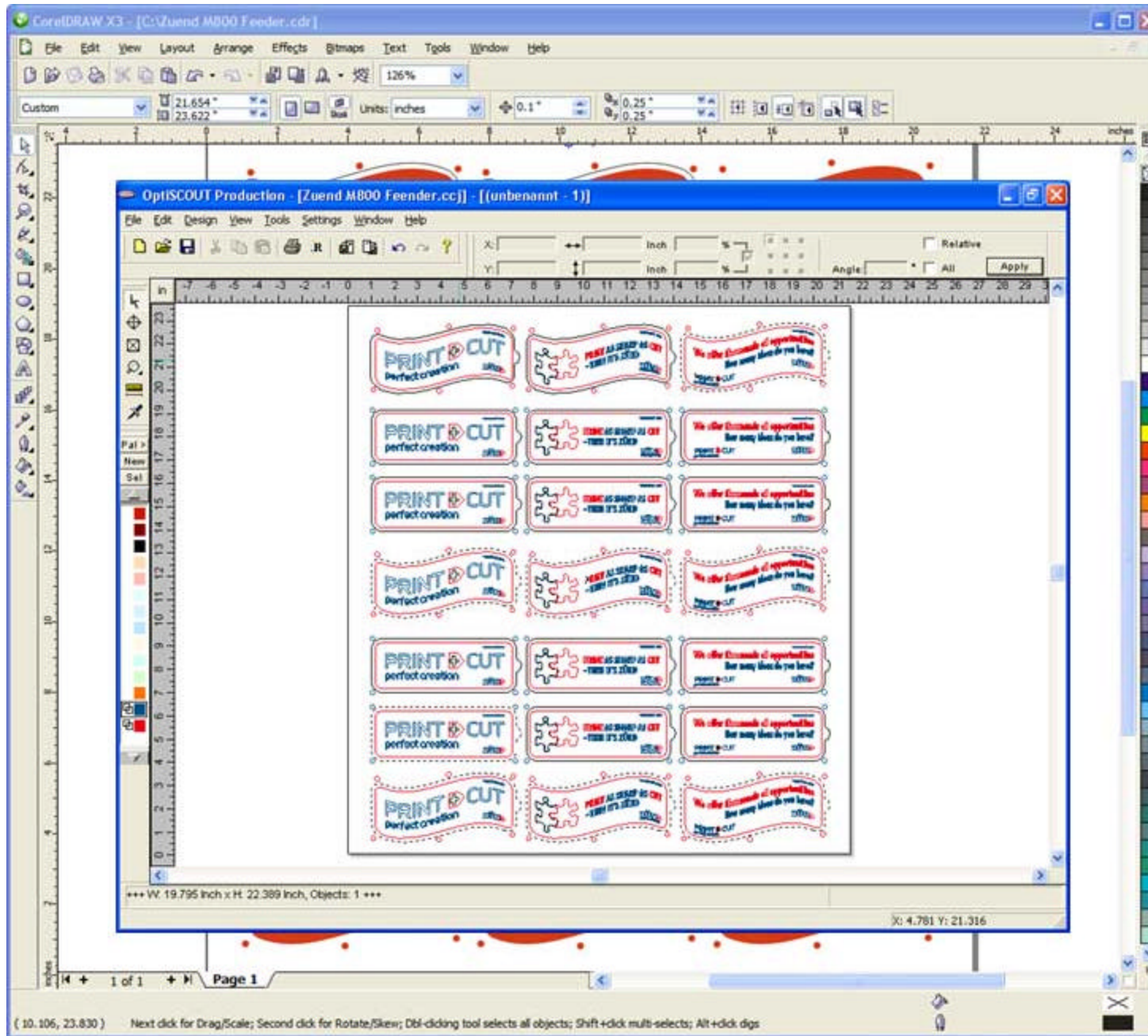


Fig. 1: OptiSCOUT Production with host program (here CorelDRAW) - job with vector contours, video marks and print objects

## Key Features

### OptiSCOUT Register / Video Marks<sup>2)</sup>

Register marks for contour cutting are comparable with the so called jog marks in the printing process. While cutters have an optical sensor for recognition of the jog marks, the OptiSCOUT system uses a CCD camera. Therefore the camera is mounted near or on the tool head (see. fig. 4). Figure 2 shows how video marks are placed in OptiSCOUT.

Shape and color of video marks can be different. Possible shapes are circle, square, edge or angle. Color can be user-defined. This is important especially for unicolored screen prints, so that no additional print pass for the marks is necessary.



Fig. 3: Video marks in several shapes and colors on different backgrounds

For each object you can define any number of video marks. OptiSCOUT calculates the optimal combination of marks by itself before output. This increases accuracy.

### OptiSCOUT Camera Module

The sophisticated CCD camera can be mounted on many different tool heads. The image view can be varied by changing the lens. Depending on the distance between the camera and material a wide angle or normal angle lens must be used. The offset between camera and tool axis is calibrated using software preferences. The attainable accuracy lies within the range of few tenth millimeters ( $\leq 0.2$  mm or 0,008 in).

The used camera system is very tolerant with low-contrast or reflecting materials. Normal room illumination is sufficient.

OptiSCOUT is compatible with already existing cameras on Zünd and Wild flatbed plotters.

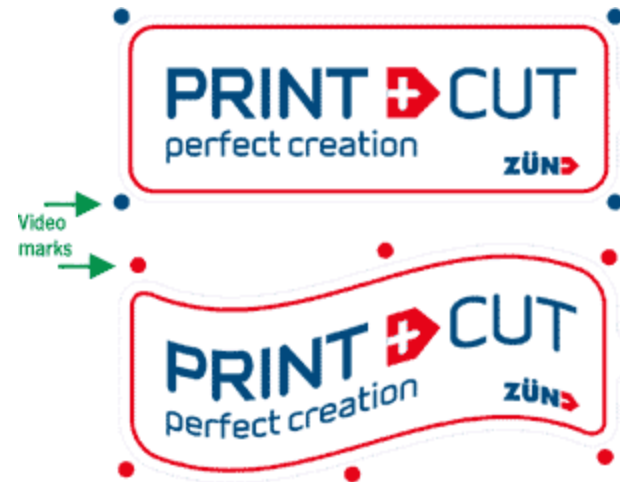


Fig. 2: Circular video marks



Fig. 4: OptiSCOUT camera case with CCD camera mounted on Tz-P tool head of a Zünd flatbed plotter

The figure shows three separate dialog boxes for camera calibration and mark recognition. The first dialog, 'Mark position', has fields for 'Mark position' (x: 0, y: 0), 'Camera offset' (x: 61.88, y: -8.80), and 'actual' (x: 61.88, y: -8.80). It includes buttons for 'Measure', 'Save', 'Cancel', and 'cut mark'. The second dialog, 'Tool position', has fields for 'Tool position' (x: 0, y: 0), 'Camera position' (x: 0, y: 0), and 'Camera offset' (x: -8.80, y: 61.88). It includes buttons for 'Read', 'Move to', 'Save', and 'Cancel'. The third dialog, 'mark recognition', has fields for 'Mark size' (82), 'Frame size' (0.80), 'Cor. factor x' (1.0000), and 'Cor. factor y' (1.0000). It includes buttons for 'Move to mark', 'Save', and 'Cancel'.

**Fig. 5: Setup for camera calibration (offset and position) and mark recognition (circle, square, edge, angle)**  
**OptiSCOUT - Flexible Usage of Object Properties**

Independent from its properties, like contour and fill, each vector object can have multiple output restrictions. So output can be restricted for the device which is used (printer, plotter, router, engraver, laser).

Above all vector objects can have specific attributes, which are important for job processing. In our case video marks are marked, in order to separate job data from other objects.

The 'Object Properties' dialog box shows the following settings:


- Object Type:** Group with 7 Members
- Bounding Box Coordinates (x, y):**
  - Bottom left: 0.00, 0.00 in
  - Top left: 0.00, 3.94 in
  - Center: 1.97, 1.97 in
  - Top right: 3.94, 3.94 in
  - Bottom right: 3.94, 0.00 in
- Restrictions:**
  - No Output to Device
  - No Output to Printer
  - No Export
  - Locked
  - No positioning
  - Fixed size
- Attributes:**
  - Video Mark
  - Register Mark
  - Drill Hole
  - Print Mark
  - Jog Mark

Buttons for 'OK' and 'Cancel' are at the bottom.

**Fig. 6: Dialog for definition of object properties, restrictions and attributes**

### OptiSCOUT Program Window

The recognition process, localization of the register marks and process itself can be tracked in the preview window. A real time camera image informs the user about the state of job production at any time. Using the optional extra radio remote control the camera image can be used for orientation and tracking of the tool head.

Figure 7 shows cross hair cursor of the camera located near the printed register marks and job objects.  - button initializes and starts the recognition process.

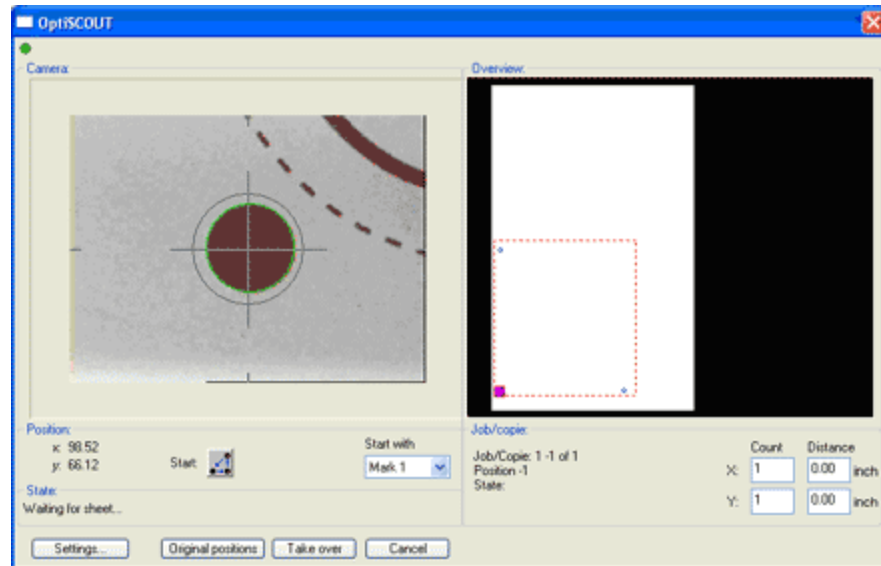


Fig. 7: OptiSCOUT camera image and job overview

### OptiSCOUT Edge Recognition

An edge recognition is useful if a material is used which doesn't allow visible register marks, e.g. plexiglass. Before scan process three register marks must be placed virtually on edges of the print job or the material.

Figure 5 shows on the left hand side cross hair cursor of the camera and the recognized sheet edge (green marking).

**Classical application:** Recognition of position of a cardboard using its edges (packaging)

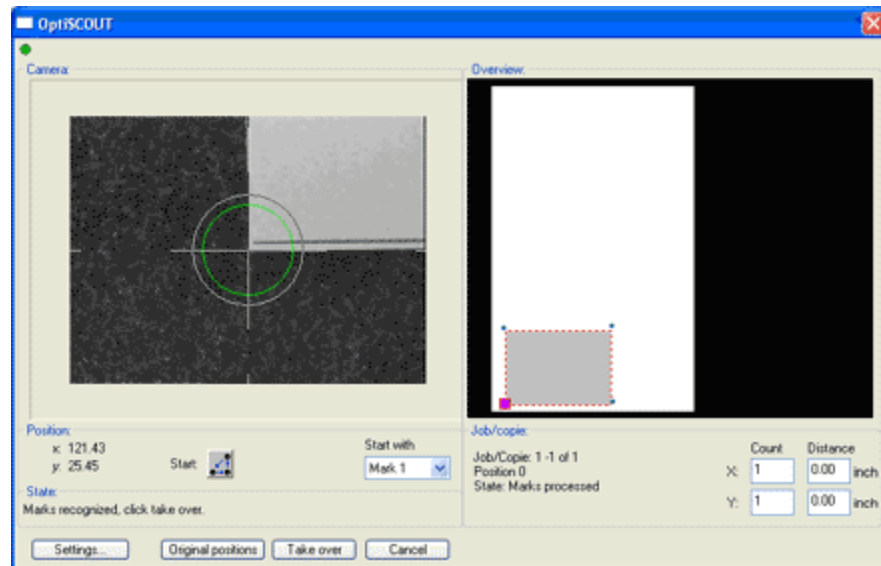


Fig. 8: OptiSCOUT edge recognition

### OptiSCOUT Output Window

Figure 9 shows how a customized driver presents

itself to the user. All controls which are supported by the driver are displayed.

Drivers can be customized in order to fit the needs of the given device. For customization contact our office.

Zünd standard drivers are part of the suite.

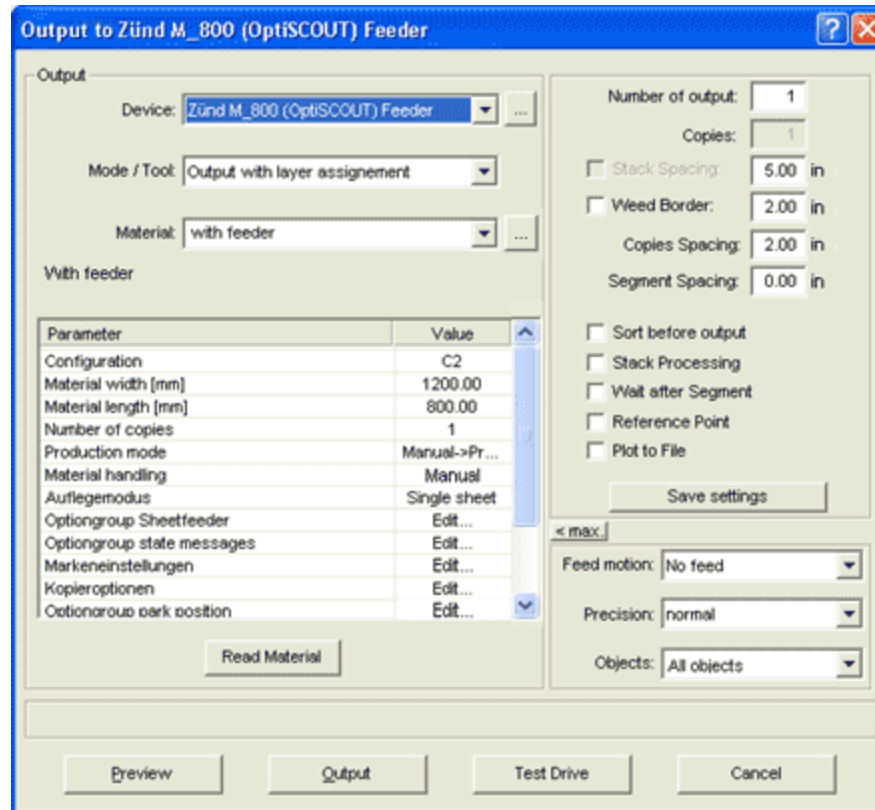


Fig. 9: OptiSCOUT Output window with driver parameters and output settings

### OptiSCOUT - Non Scaled Output

For non scaled output only positioning is done using video marks. Output objects are centered on the expected position in unchanged size. This option is activated by selecting 'fixed size' in 'Object Properties' (see Fig. 6).

In this case output may not be scaled, because final product must fit in a given form (see example membrane keyboard).

Differently than as a rule without scaling only rotation and position are corrected.





Fig. 10: Application example for non scaled output: membrane keyboard

### OptiSCOUT - Flexible tool head control

Figure 11 describes the different steps for producing a packaging sample. The printed cardboard is placed on the flatbed table. Edge recognition of OptiSCOUT corrects orientation here without using its video marks. After recognition the back side is creased with the creasing tool. Then cardboard is cut with the tangential knife or the electrical oscillating knife. Final product of this workflow is a packaging sample with scale 1:1.



Fig. 11: Application example for packaging

### OptiSCOUT - Reorder Objects

Figure 12 shows the special case, where non closed object contours should be given out. For output time it is critical in which order objects are handled. OptiSCOUT has the possibility to determine start (S) and end (E) of a vector and order of processing.

In packaging rearranging of non closed object contours often is important.

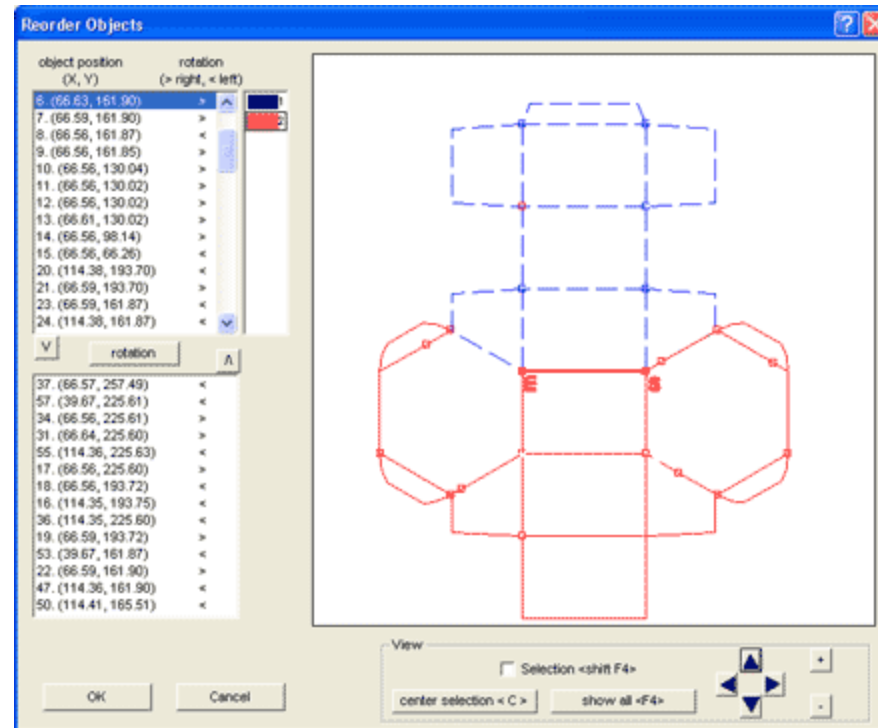


Fig. 12: OptiSCOUT - Reorder Objects

### Simulation of Traverse Path

Traverse path can be simulated for each layer before output. Simulation speed can be adjusted continuously.

Aim is to shorten the traverse path. A base sorting after selection of main direction is done by OptiSCOUT itself. Improvements can be done at any time and validated with a new simulation.



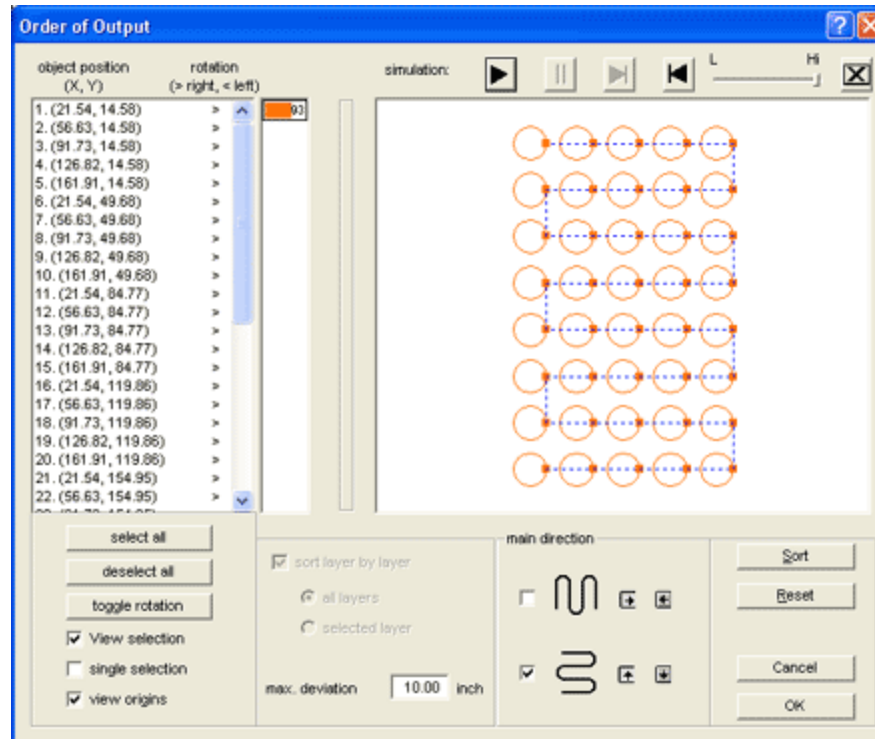


Fig. 13: OptiSCOUT - Simulation of traverse path

### OptiSCOUT - Fully Automated Workflow

The Group of parameters shown in figure 14 and 15 define constraints for fully automated workflow. For multiple copies of identical jobs the number of copies and search position of video marks can be predefined before output. Feed of material is done by an automatic sheet feeder.

Additionally you can define how to react in case of error. Thus an unattended production without user interaction is possible.

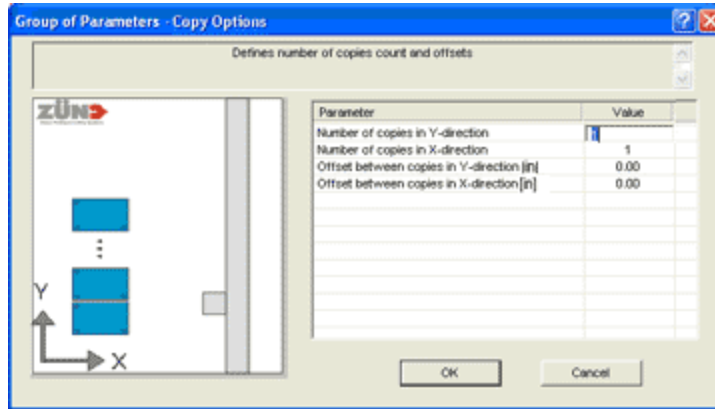


Fig. 14: OptiSCOUT - Copy options

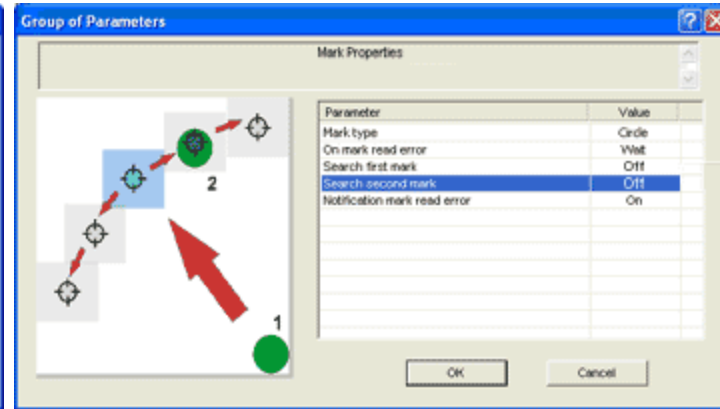


Fig. 15: OptiSCOUT - Video mark properties

### OptiSCOUT Error Handling

Via push SMS status and error messages of the production system can be transferred to a mobile phone.

For sending eMail and SMS messages a configured eMail client and net access (LAN or internet) are required.

Parameter	Value
Mark error	Wait
Message Mark Error	On
Feeder Error	Send Email
Receiver Error Mail	SMS
Max. Feeder Time [s]	50
Production Mode	Manual->Production
Status Messages to:	Email
Receiver Status Mail	SMS
Status Log File	c:/State.log
Preload Feeder	On

Fig. 16: Parameters for automatic status or error messaging



Fig. 17: Error message in clear text on cellular phone

#### Status messages:

- Job done
  - via eMail
  - via SMS
  - log file
- Machine time protocol (e. g. How long did output last?)

#### Error messages:

- Mark error
  - via eMail
  - via SMS
  - log file
- Feeder error
  - via eMail
  - via SMS
  - log file

### OptiSCOUT Remote Maintenance

Integrated in OptiSCOUT is the possibility to support and maintain the system via internet. The supporter is given a save access on the users computer system.

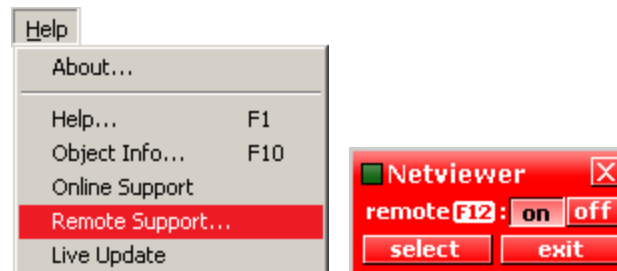


Fig. 18: Remote maintenance and support with Netviewer 'oneZone'

OptiSCOUT is the ideal extension for multifunctional flatbed plotters with customized tool heads, conventional HPGL and G-Code routers and Zünd or Wild flatbed plotters with/without milling option. One market segment in which OptiSCOUT has an outstanding relevance is POP<sup>3)</sup> industry, who want to mill outline-exactly printed material for billboards. Besides this market segment OptiSCOUT is a precise tool for industrial usage wherever the position of work pieces has to be recognized, corrected or compensated.

1) Linear compensation to correct deviations as consequence of stretch, contraction, distortion and rotation

2) The terms Register Marks and Video Marks are used synonymously

3) Point Of Purchase advertisement - advertisement at the point of sale

#### What's in the box:

- OptiSCOUT Production software
- optional job preparation and design software  
[OptiSCOUT Production & Design](#)
- optional CCD camera with wide angle or normal angle optics  
+ Video grabber (external)
- Radio remote control (optional extra)

#### System requirements:

- Windows 2000 SP4, XP SP1 or SP2
- Processor Intel/AMD min. 1.5 GHz
- RAM: min. 256 MB
- Video card with min. 32 MB
- CD or DVD drive
- Free hard disc capacity: min. 750 MB
- Free USB port (for copy protection)
- Free USB port (for ext. video grabber)
- 1 x serial interface RS-232 or alternatively one more free USB port (for device control)
- Recommended: DSL internet access (for remote maintenance and software Live Update)

#### Supported devices:

- Customized drivers for HPGL- or G-Code enabled machines can be generated (Command set with 'read out' command necessary)
- Indimco - multifunctional flatbed plotters
- Zünd and Wild flatbed plotters with/without mill option

! OptiSCOUT is compatible with already existing cameras on Zünd and Wild flatbed plotters.

#### Job modes:

- Manual ('place objects by hand')
  - Tandem - mutual carpet / read out
- Feeder available
  - Single sheet
  - Carpet flatbed
- Roll (roll material)
- Multiple copies

#### In Preparation:

- Job branding and recognition via OCR or bar code
- Contour tracing
- Video digitizing
- Definable mark types
- Precalculation of output time
- PDF import and export

#### Classification:

- Production software with align plug-in



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