IVA

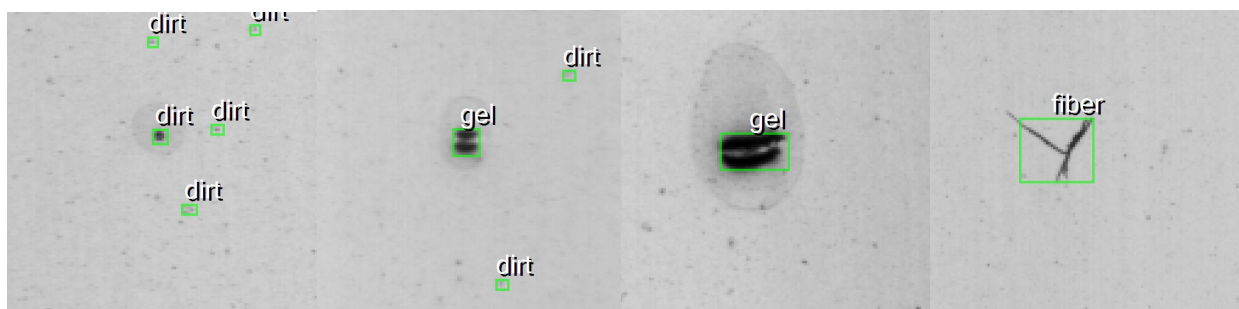## Machine Vision Systems

WEB INSPECTION

WIS1000 - SYSTEM

Introduction

The WIS1000-system performs real time 100 % automatic inspection on continuous web products.

Application areas include:

- Paper & Pulp (Dirt Counter)
- Plastic Film (Gel Counter)
- Metal film
- Glass sheet
- Coatings
- Cables & tubes

Materials produced in a continous roll or sheet, such as paper, textiles, film, foil, plastics, metals, glass, or coatings, are best inspected by line scan systems. Line scanning offers unlimited pixels in the direction of a web's motion with zero smear even at high speeds, higher dynamic range, greater processing efficiency and much lower price/pixel.

Based on the latest line scan CMOS camera technology the WIS1000 system uses advanced hardware image processing functions. Up to 16 digital line scan cameras capture images of the moving web. The system processes these images in hardware (FPGA-circuits) and verifies the product for presence of possible defects: gels, contaminants, dirt, holes, coating voids, bubbles, streaks, repeating defects,...These defects will be detected and classified upon contrast, shape, width, length, surface and density measurements. After classification they are displayed and stored in data-bases.

Features:

- Inspected web width range from 5 mm to 8 m. (up to 16 line scan cameras, 8K pixels / camera)
- Web speeds up to 1000 m/min.
- Up to 4 webs can be defined and separately reported.
- Automatic gain control, flat field correction ,automatic edge tracking and opacity control on all webs.
- Detection and classification of defects as small as 10 micron (dependent upon # of cameras and web width to be inspected).
- Classification based on contrast, model recognition, width, length, surface and density measurements.
- Convolutional neural network classification engine.
- Repeating defect detection and analysis.
- Supports up to 32 user definable defect categories.
- Operates in transmission, reflection or any combination of any angles.
- Fully programmable lane structure with a max. of 2048 lanes   (slitter applications).
- Real time or distance delayed alarm outputs triggered on discrete defects or density exceedings (sheeter applications, tab throwers, spray markers).
- Defect data and images are visualised and stored in databases for review.
- Simple and user friendly operator interface with password protected access levels and on-line item sensitive help.
- Remote control over network connection
- Excel-compatible data reports
- Database connection Sql –Access- Oracle
- OPC connectivity

System components:

- Controller with Panel PC – Intel i7 Quad Core, 15" resistive touch panel

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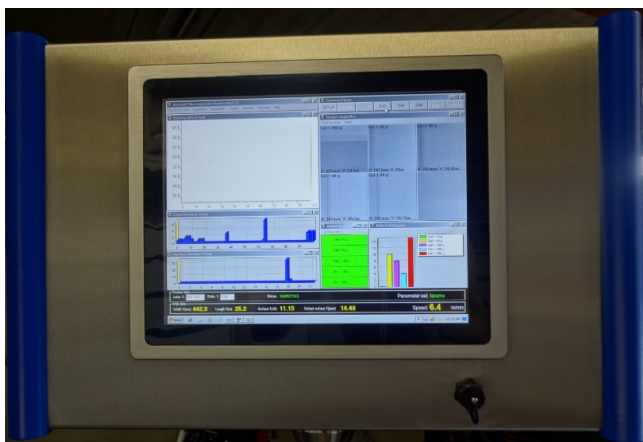
- Digital line scan camera type Necta (up to 16 cameras can be connected)

    - standard resolution : 8K pixels
    - 12 bit digitisation, output through USB3
    - high responsivity
    - 3 GHz (90K scans/sec)
    - antiblooming
    - exposure and gain control
    - flat field correction
    - IP54 enclosure

- VHO apertured fluorescent light source or VHO led light source (up to 8 light sources can be controlled)


    - high intensity
    - high uniformity
    - 75 kHz for ripple-less light output
    - aperture lamp with internal reflective coating
    - programmable light intensity with feed-back regulation
    - compact IP54 enclosure
    - lamp lengths from 0.15 up to 2.5 m
    - lamp replacement from the side (sliders) so alignment stays intact

- Encoder system for length measurement

    - incremental encoder
    - 10000 pulses/m
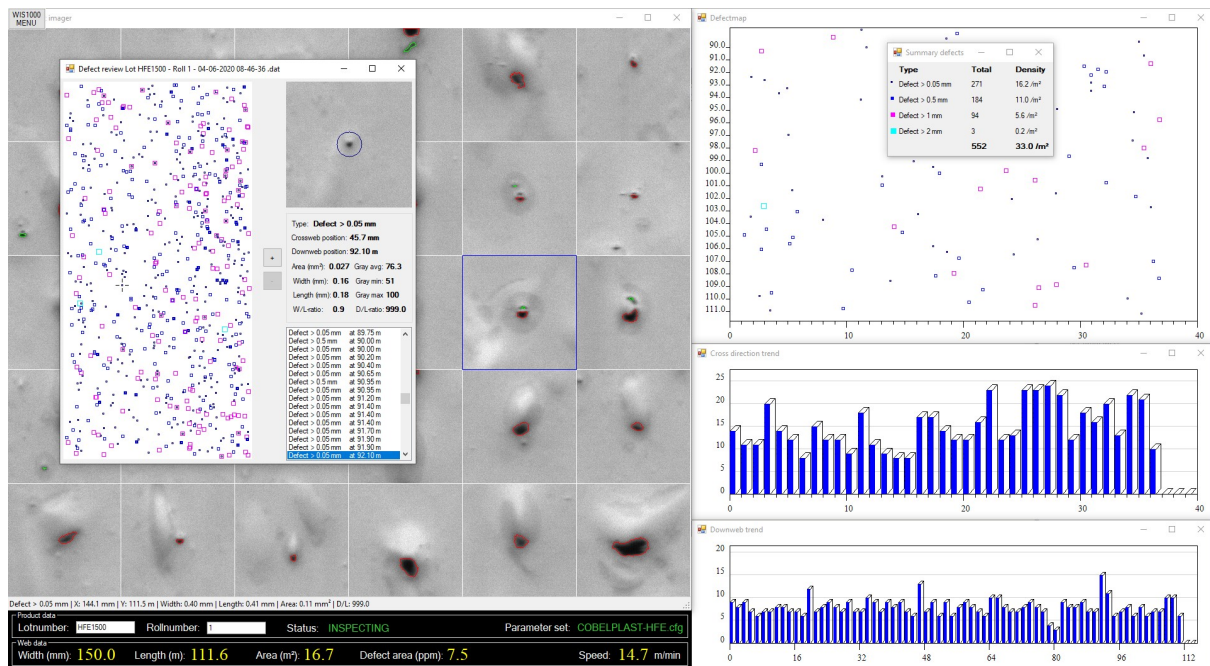   - web speeds from 0 to 1000 m/min

- Interfacing
    - 4 opto-isolated in- and outputs (real-time or distance delayed for spray-markers or tab-throwers)
    - 4 opto-isolated analog in- and outputs (0-10V)
    - TCP-IP-link
    - Remote access (network or modem)
   - Integrated OPC-server
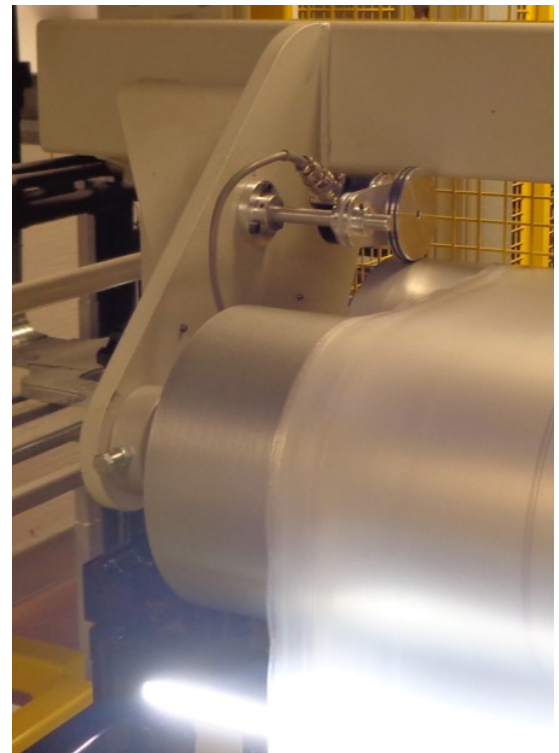
System software

The WIS1000 realtime displays are available as separate sizable windows that can be combined freely:

- Running defect map
- Defect histogram & summaries
- Cross direction defect distribution trend
- Downweb defect distribution trend
- Defect density alarms
- Defect imager ringbuffer
- Status window
- Defect database explorer
- Oscilloscope (set-up aid to display live camera signals & thresholds)
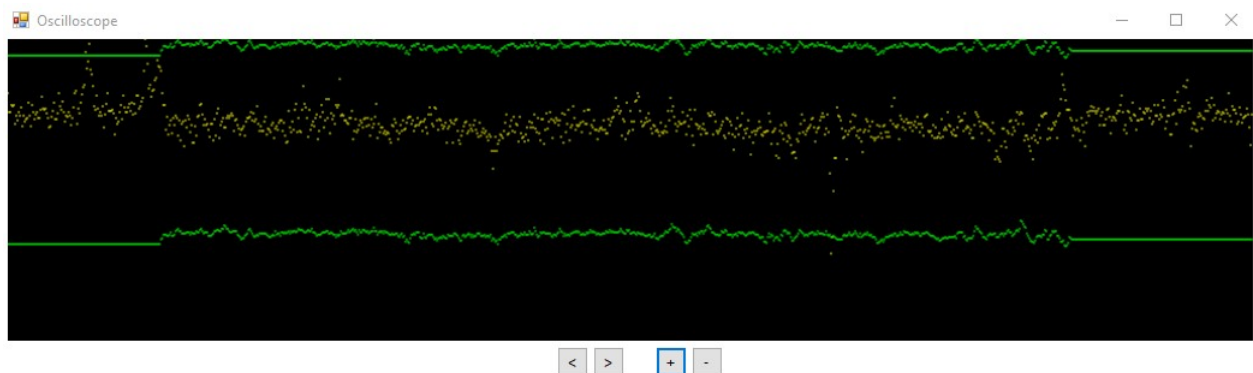
All the parameters that determine the inspection task, including defect definitions, camera parameters and display configuration, are stored in parameter sets. The operator does not have to be familiar with these settings, he only selects a product type (parameter set) from a list to set-up the entire inspection system.

Due to the high degree of software modularity, additional inspection tasks or functions can relatively easy be implemented.

Defect definitions

Defects are defined with a simple formula, which makes it very easy to define different size categories. In this formula you can also specify one or more modeltypes to make a distinction between the different defect types.
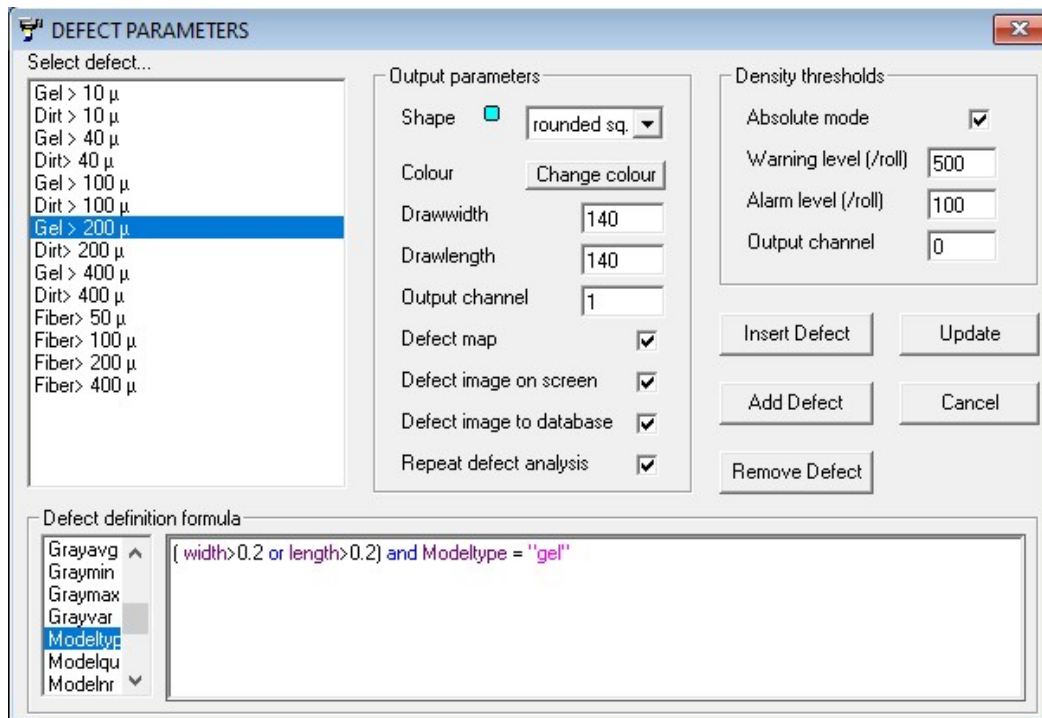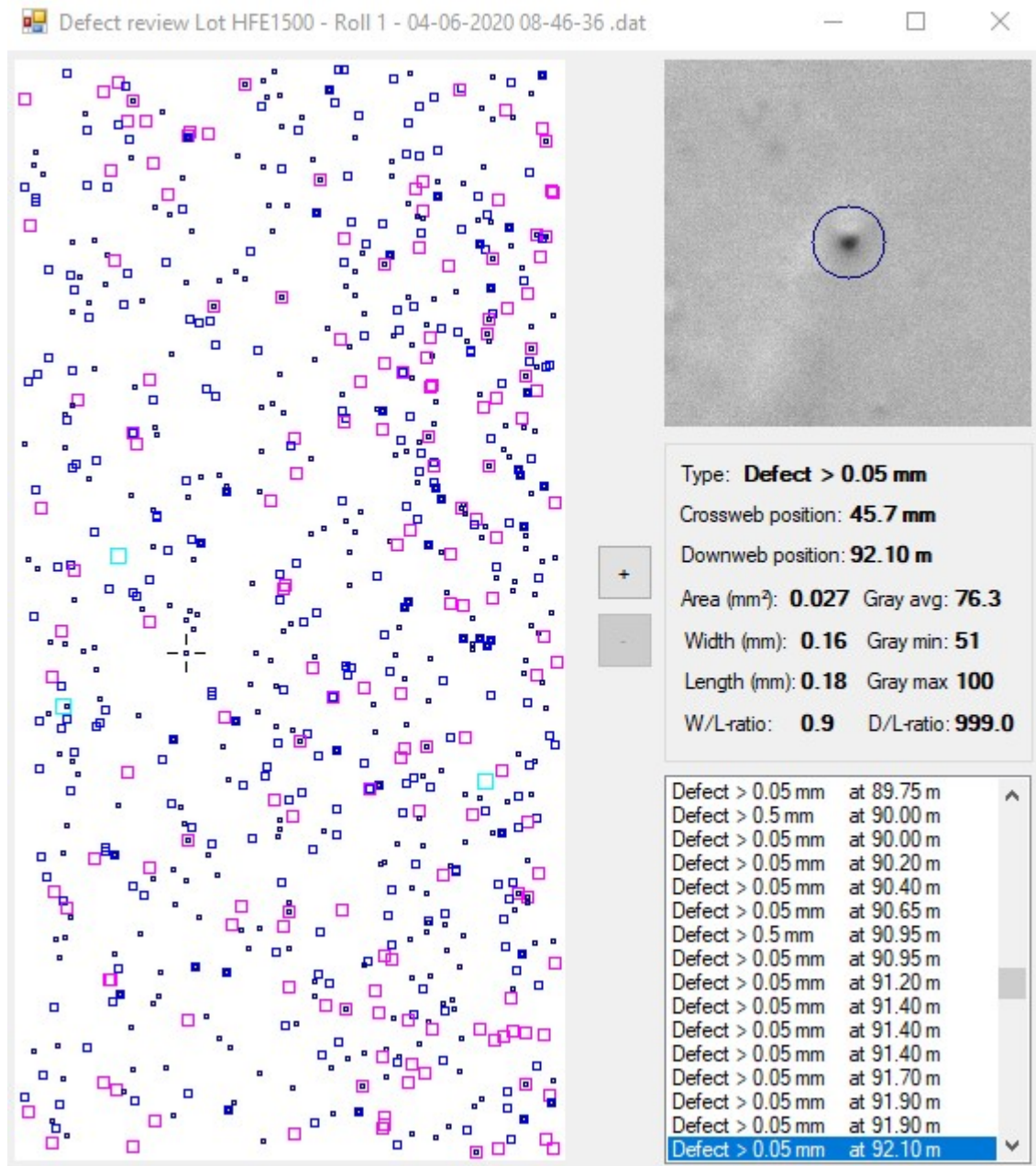

You can create as many modeltypes as you want. Each modeltype consists of a variable number of trained defect models. The classification engine works consistent with a few trained models of each defect type. You don't need a large data set. This leads to a shorter training time and a fast but consequent defect classification.
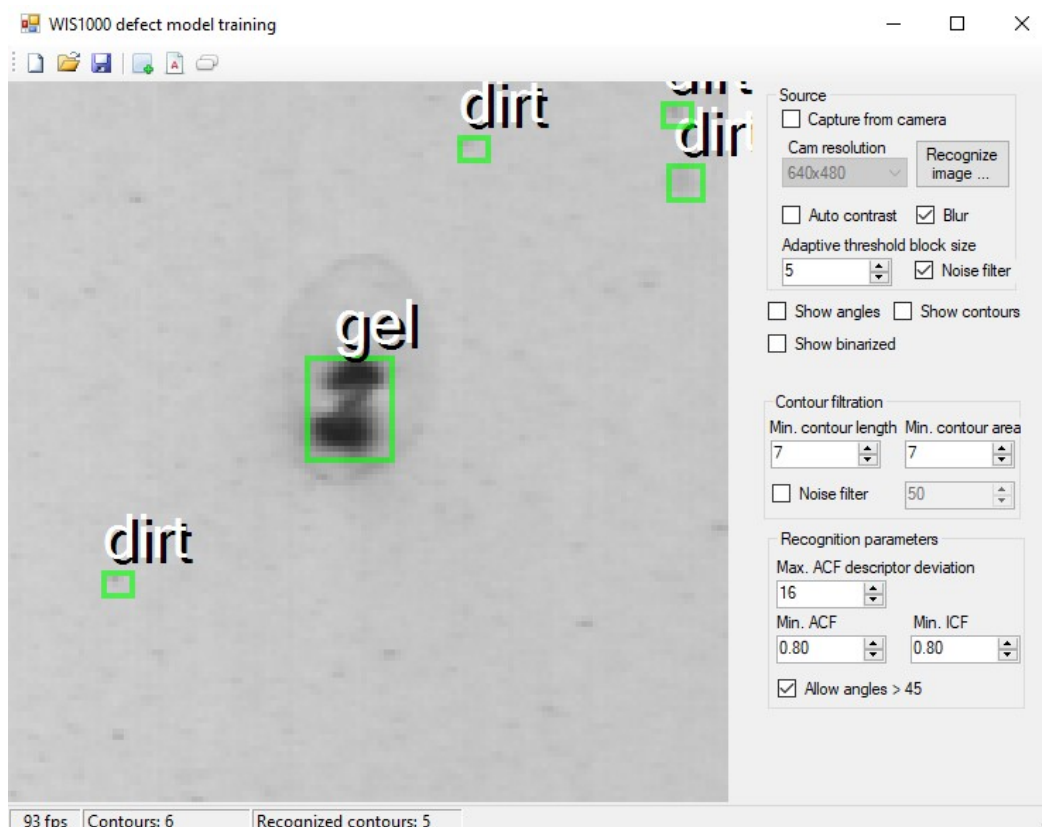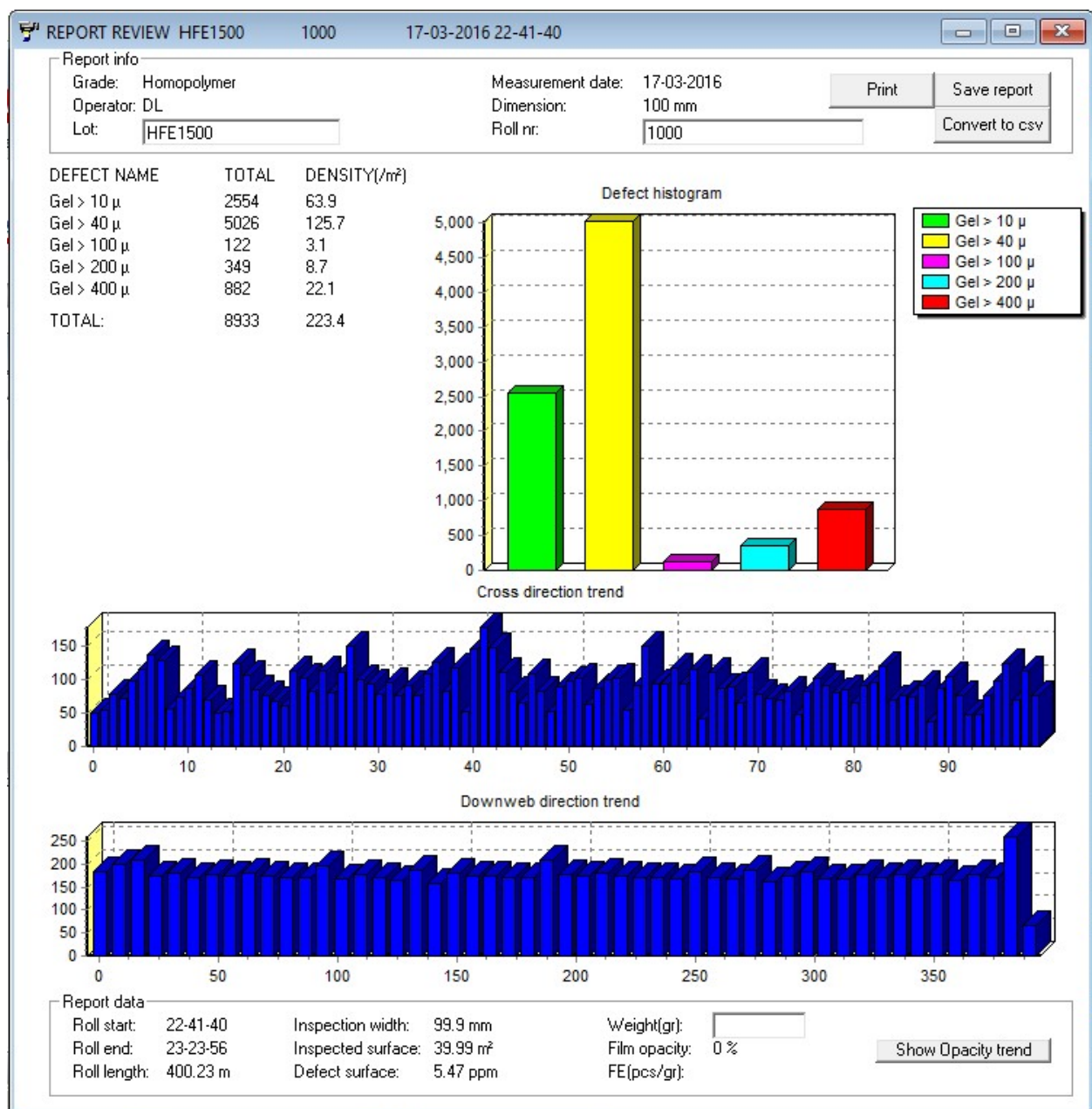
Reports

> Detailed defect data lists

Shows you all the defects of the entire roll on a single map (zoomable & scrollable). If you click near a defect, the cursor (cross-hair) jumps to the nearest defect. The image of the defect is shown, together with the most important data like type and size. Notice the circle in the image. This is useful when there are more defects on a single image. You can also select a defect by clicking on the list.

Defect review Lot HFE1500 - Roll 1 - 04-06-2020 08-46-36 .dat

Type: **Defect > 0.05 mm**

Crossweb position: **45.7 mm**

Downweb position: **92.10 m**

Area (mm²): **0.027**   Gray avg: **76.3**

Width (mm): **0.16**   Gray min: **51**

Length (mm): **0.18**   Gray max **100**

W/L-ratio: **0.9**   D/L-ratio: **999.0**

Defect > 0.05 mm   at 89.75 m
Defect > 0.5 mm   at 90.00 m
Defect > 0.05 mm   at 90.00 m
Defect > 0.05 mm   at 90.20 m
Defect > 0.05 mm   at 90.40 m
Defect > 0.05 mm   at 90.65 m
Defect > 0.5 mm   at 90.95 m
Defect > 0.05 mm   at 90.95 m
Defect > 0.05 mm   at 91.20 m
Defect > 0.05 mm   at 91.40 m
Defect > 0.05 mm   at 91.40 m
Defect > 0.05 mm   at 91.40 m
Defect > 0.05 mm   at 91.70 m
Defect > 0.05 mm   at 91.90 m
Defect > 0.05 mm   at 91.90 m
Defect > 0.05 mm   at 92.10 m

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> ➢ Roll summaries

> ➢ Production campaign reports

Installation

Cameras and light sources are mounted on a solid stainless steel or coated steel frame to avoid heavy vibrations (some reflection set-ups are susceptible to this).

Installation of the system and set-up for inspection can be done in a short time (2 days).

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