

SOFTSOLUTION
GLASS IQ



... AND QUALITY BECOMES VISIBLE



VirtualDigitizing

Anisotropy

Glass defect inspection

Edge stress All-in-one solution

quality assurance systems

Edge Stress

LineScanner

CulletScanner quality control

With an inside view, you can understand.

With an overall view, you can decide.

With a far-sighted view, you can control things.

We make **quality** visible.

As an innovative company, Softsolution specialises in automated quality assurance systems, electronic image capture and software development in the glass industry.

Progress through new solutions and innovative technologies provides our customers and partners with new perspectives – sustainably, with vision – worldwide.



LineScanner

Quality inspections at the highest level

Page 6

LineScanner – experience the new standard of scanning technology.

The LineScanner can be installed anywhere in the production process, saves space, and checks flat glass products for all quality and dimensional defects.



CulletScanner

Automatic fragmentation image analysis

Page 24

CulletScanner – put your mind at ease with the use of innovative technology.

Scanning at a high resolution, the CulletScanner scans all fracture patterns and analyses them precisely within seconds. Anisotropy imaging and the measurement of the edge stresses are also an available option.



VirtualDigitizing

Digital object data capture with maximum precision

Page 28

VirtualDigitizing – will change the way you work.

Fast and simple digitizing of templates, 2D objects and drawings without the need for a digitizing table – an intelligent solution for tomorrow's production.

Softsolution is setting new standards

Staying ahead of the competition means producing faster, more efficiently and more flexibly. These factors play an important role in the glass industry, where the exacting demands of customers and partners must be met. This is why we have devoted ourselves to the topic of glass for more than 15 years, specialising in quality assurance systems at the highest technical level in the glass industry.

Quality made in Austria

All our products are developed and produced at our location in Waidhofen/Ybbs in Austria – from individual components and software to the final finished product. As a complete solution supplier, we are responsible for the entire process: individual planning and implementation tailored to your production.

Personal advice

We will assist you as a competent partner. At Softsolution, we attach great importance to the highest levels of quality and safety. Convince yourself of our range of products – we will be pleased to provide you with personal advice for customized solutions.

SEE IT - BELIEVE IT - GLASS IQ





A PRODUCT WITH MANY VERSATILE USES



LineScanner

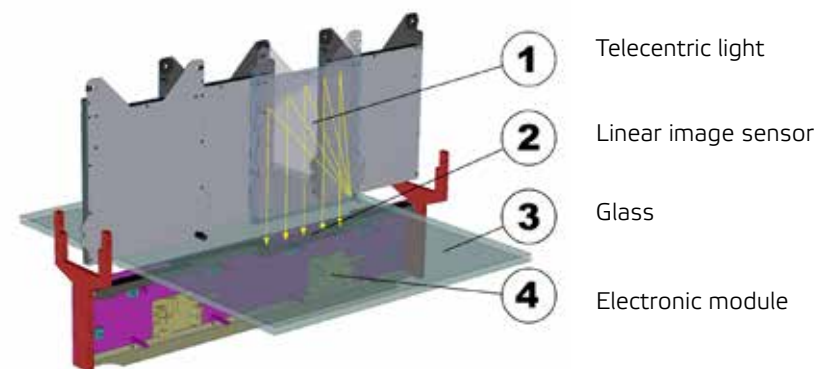
Quality inspections at the highest level



The LineScanner is **THE** solution for all quality inspections of transparent flat glass products such as single sheets, insulating glass, automotive glass, processed glass, polycarbonate or film. LineScanner inspects your products with extreme precision for all defects in quality and dimension. Its flexibility as well as its simple operation and installation allow it to be put into operation quickly and easily with minimum space requirements.

The unique parallel light technology enables the LineScanner to be operated with the same hardware, to inspect almost all flat glass up to insulating and laminated glass - both horizontally and vertically. This quality assurance system impresses with its high degree of flexibility and ease of use. The LineScanner checks flat glass products for optical defects such as scratches, inclusions, edge damage, screen print, add chips, as well as dimensional

errors in regards to overall geometry, drill-hole locations and positions. The inspection of glass thickness and the coated side, as well as the overall build up and overall bow can be conducted quickly and easily. The latest developments in the field of inspecting anisotropies and the evaluation of the edge stresses make the LineScanner the most complete quality inspection system available.





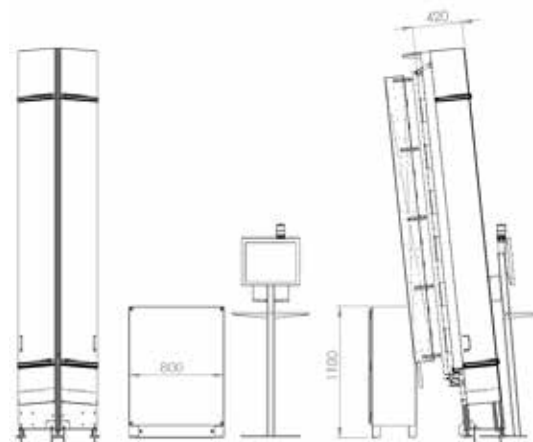
■ LineScanner – vertical orientation



■ LineScanner – horizontal orientation

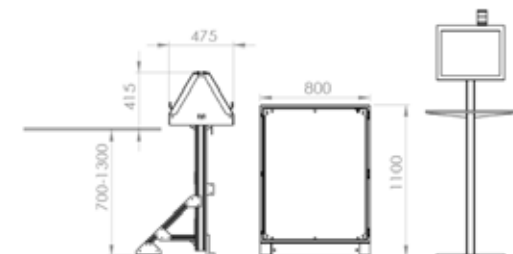
Technical details:

- Resolution 200 dpi
- Single sheet inspection or batch operation
- Maximum transport speed during the scan process 48 m/min
- Maximum glass/element strength 100 mm
- Network connection required
- Windows 7 or higher, English or German operating system, English or German keyboard layout
- Ambient temperature between -10° and 45° Celsius
- Maximum glass temperature 70° Celsius
- Power supply – Europe: 230 V , 16 A, single phase , 50 Hz
- Power supply – US: 110 V , 16 A, single phase , 60 Hz
- Float, coloured/printed, laminated, toughened, heat-treated glass
- Clear glass with flat surface, 15-99 % transparency
- Inspection of rectangles and shapes of an type possible
- Glass with structured surfaces or opaque layers cannot be inspected



vertical

Width of about 700 mm, depth only 420 mm



horizontal

Depth of approx. 475 mm, individual width possible

LineScanner

+
CHECKS
+

SURFACE & EDGE QUALITY



Scratches, inclusions,
coating voids, edge chips

TEMPERING QUALITY



Anisotropy, edge stress,
thermal image

DIMENSION QUALITY



Outer contour, inner contours,
cutouts, drill holes, frame inset,
georgian bars



SOFTSOLUTION

GLASS IQ

SPECIAL QUALITY CHECKS



Logo test, data matrix code, angularity, overall bending, glass thickness, coating surface

ARCHIVE DATABASE



Excel export, daily /weekly statistics, online, instant access

LINESCANNER MANAGEMENT CONSOLE



Status check of all systems, maintenance messages, production control

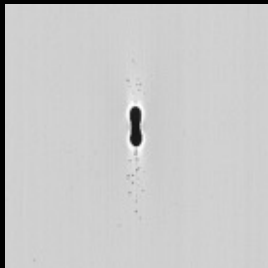


SURFACE & EDGE QUALITY

Check for surface and edge defects

The glass quality and edge check detects a wide range of visible defects. These range from scratches and inclusions to coating errors and edge defects (i.e. chips). Each recorded defect is categorized and evaluated using

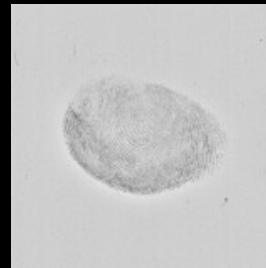
custom quality settings. The simplicity of setting the sensitivity in such a quality inspection tool is imperative. The LineScanner provides the optimal solution in this regard.



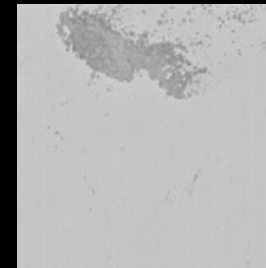
Inclusions



Scratches



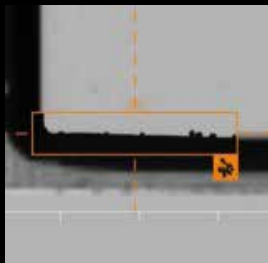
Fingerprints



Coating defects



Other defects



Particles in air space



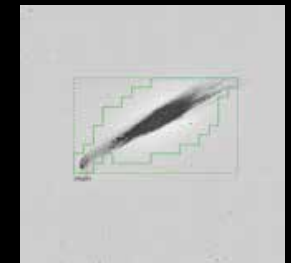
Butyl defects



Edge defects



Inclusions



Dirt



DIMENSION CONTROL

Check for dimension

Demands for precision size control are constantly increasing and are particularly important for a material such as glass. The LineScanner checks dimensional tolerances inline during the production process – without any effect on the cycle time. Starting with the external contours, inner

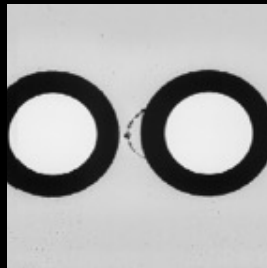
contours, and the edge cut-outs, the dimension check also inspects drill holes for parameters such as location and diameter. The telecentric imaging by the LineScanner is what makes such a



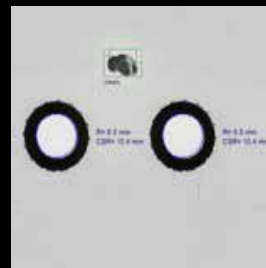
precise measurement possible in the first place and is a basic physical prerequisite.



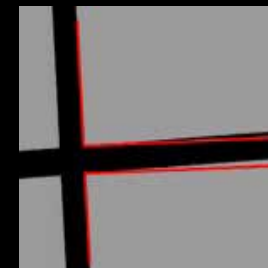
Drill hole diameter



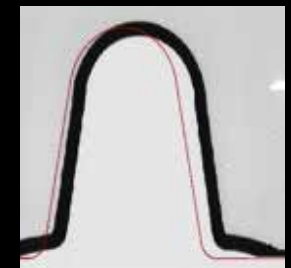
Defects around drill holes



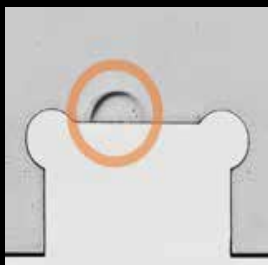
Drill hole



Grid alignment



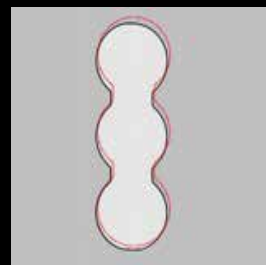
Cut out position



Defects around cut outs



Drill hole diameter



Cut out



Drill hole position



Frame inset, georgian bars

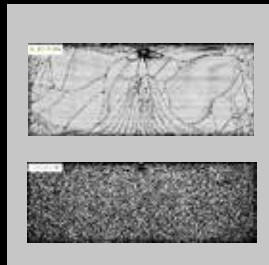


TEMPERING QUALITY

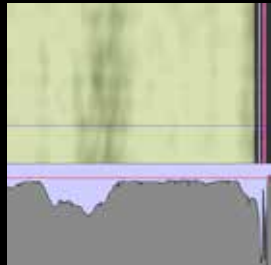
Check for anisotropies
& edge stress

A seamless record of the glass quality is imperative. A lack of useful feedback during the heat-treating process can lead to varying qualities within the final product. The LineScanner provides this feedback by displaying real-time

data to the tempering furnace operators. With the help of the LineScanner, companies can now check every heat-treated lite for anisotropic properties – in combination with the thermal imaging – and the edge stresses.



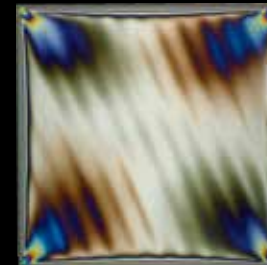
Edge stress



Anisotropy pattern



Overall bending



Anisotropy



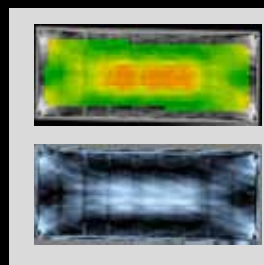
Anisotropy batch mode



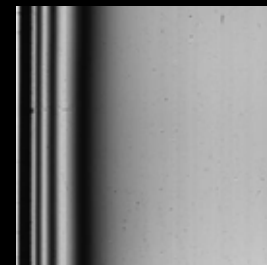
White haze



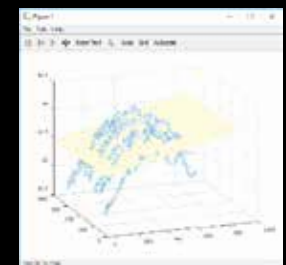
Measurements



Anisotropy RGB



Edge Stress



Overall bending



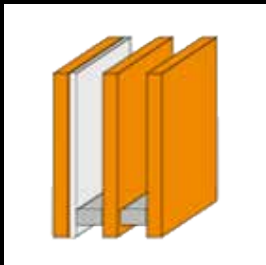
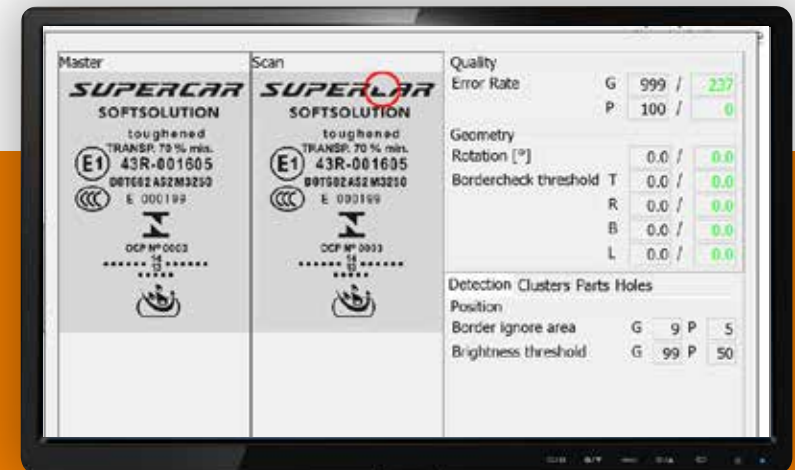
SPECIAL QUALITY CHECKS

Check for coating, screen printing and logos

The LineScanner can handle any challenge, no matter how unique. The wishes and demands of our customers show again and again the large performance range of the LineScanner. The quality check of logos, developed specifically for the automotive industry, has now become standard.

The LineScanner logo check can perform the following:

- Verify the correct logo
- Logo position and rotation
- Missing parts within a logo
- Ink strength (too much/not enough)
- Detailed errors in graphics
- Screen printing errors
- Correct screen print position
- Glass thickness
- Unit build-up of insulated glass



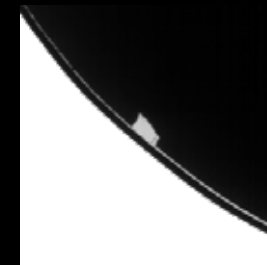
IG-setup



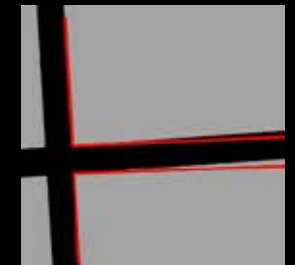
Glass thickness, side of coating



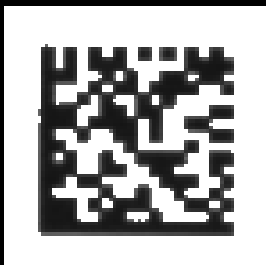
Screen printing test



Screen printing defect



Screen printing defect



Data matrix code



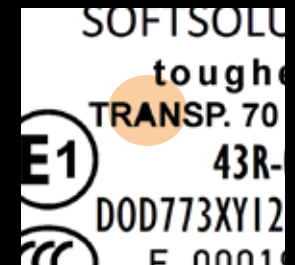
Logo quality check



Logo quality check



Logo quality check



Logo quality check

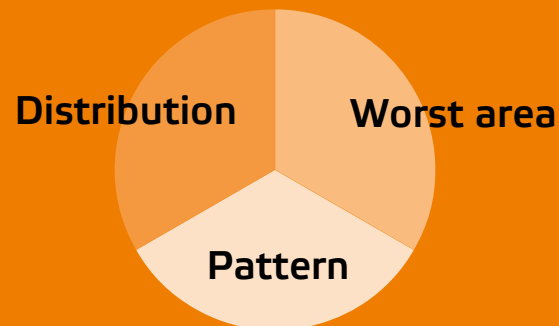
A LineScanner –
the all-in-one option

**NEW >> Check for
anisotropy/isotropy
and edge stress**

With the use of the LineScanner on a tempering furnace, we have created a masterpiece in the field of non-destructive quality controls. Quality checks such as geometry, surface quality, edge quality, DMS tests, anisotropy and edge stress can now also be monitored.

Evaluating anisotropy

- Distribution diagram (ratio area to nm)
- Assessment of the worst areas
- Sample evaluation



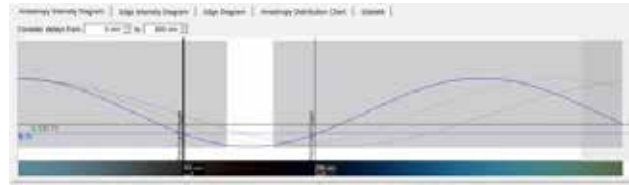
Anisotropy



Edge stress

ANISOTROPY

Details



one light-source
large area of undefined and inaccurate measurement

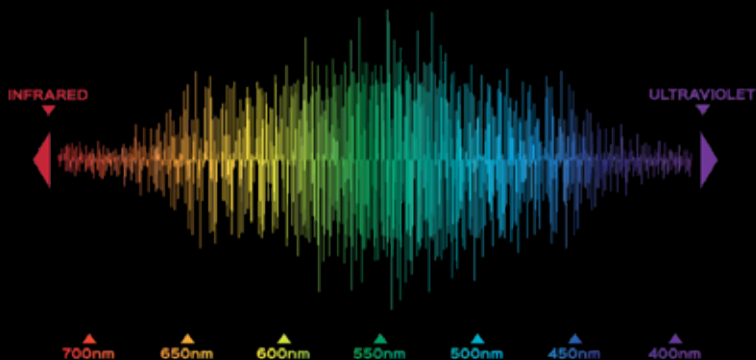


two light-sources
tremendous reduction in area of indetermination



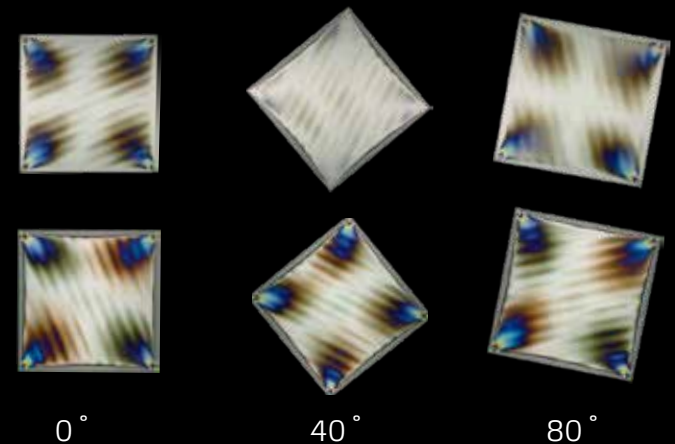
three light-source
no indetermination for a wide range

How the LineScanner achieves precise results:



- Telecentric setup
- Equal optical path length at every position
- Three different wavelengths
- Wide [nm] measurement area
- Circular polariser
- Exclusion of defects
- High resolution

The circular filter is essential:



Edge stress Details

- Measurement of the edge stress every 1.2 mm along the entire glass perimeter.
- Calculation of the median of all measurements and the standard deviation.
- Displayed in either MPa or psi.
- Correlation to the surface tension and thus to the expected fracture pattern.

72
[MPa]

Scan#	thickness [mm]	pressure [MPa]	tension [MPa]	edge stress [MPa]	Deviation [MPa]	Worst [mm]	Deviation [mm]	Median [Mpa]	Deviation [MPa]	Cullet MIN	Cullet MAX	area [mm²]
7270	7.8	42.4	21.5	71.27	2.56	153	94	56	34	-	-	-
7271	7.8	42.5	21.7	72.32	3.13	154	95	61	33	-	-	-
7272	7.9	43.6	22.6	71.40	3.09	154	95	61	33	-	-	-

80
[MPa]

Scan#	thickness [mm]	pressure [MPa]	tension [MPa]	edge stress [MPa]	Deviation [MPa]	Worst [mm]	Deviation [mm]	Median [Mpa]	Deviation [MPa]	Cullet MIN	Cullet MAX	area [mm²]
7277	7.9	56.4	28.2	80.83	4.64	152	98	52	33	-	-	-
7278	7.9	56.6	28.3	79.51	4.74	144	93	46	27	-	-	-
7279	7.8	58.1	29.4	81.01	4.37	156	99	56	27	-	-	-

86
[MPa]

Scan#	thickness [mm]	pressure [MPa]	tension [MPa]	edge stress [MPa]	Deviation [MPa]	Worst [mm]	Deviation [mm]	Median [Mpa]	Deviation [MPa]	Cullet MIN	Cullet MAX	area [mm²]
7280	7.9	73.1	36.6	85.98	3.75	140	84	53	25	20	89	159.7
7281	7.7	72.9	36.1	85.67	3.37	142	93	144	24	21	71	251.1
7282	7.8	74.9	37.2	85.51	5.46	153	89	60	25	28	85	104.3

94
[MPa]

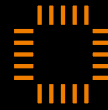
Scan#	thickness [mm]	pressure [MPa]	tension [MPa]	edge stress [MPa]	Deviation [MPa]	Worst [mm]	Deviation [mm]	Median [Mpa]	Deviation [MPa]	Cullet MIN	Cullet MAX	area [mm²]
7283	7.9	90.4	45.4	94.61	5.72	154	101	59	27	80	186	53.9
7284	7.9	91.3	45.5	93.11	4.50	120	73	45	19	89	203	52.2
7285	7.9	93.1	46.2	94.00	4.17	117	65	49	19	97	213	34.2

Measurement example edge stress
from 72, 80, 86 to 94 [MPa]

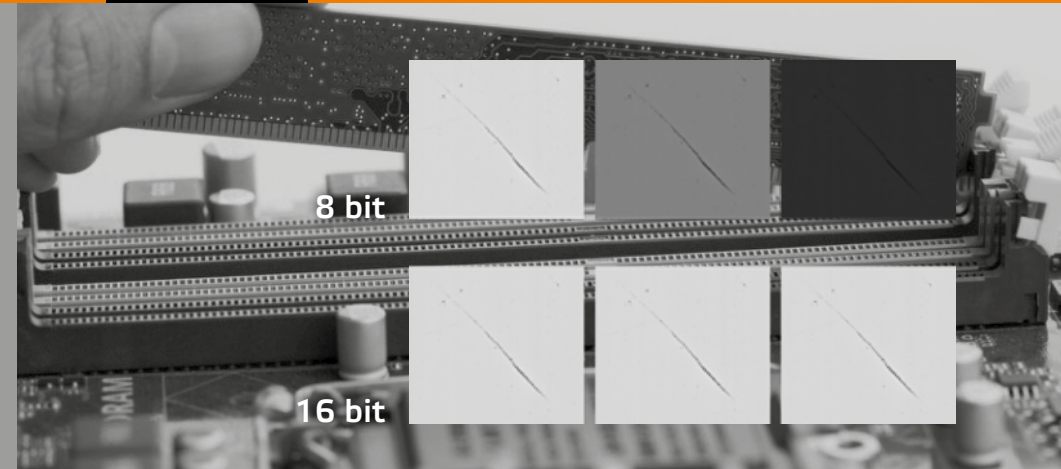
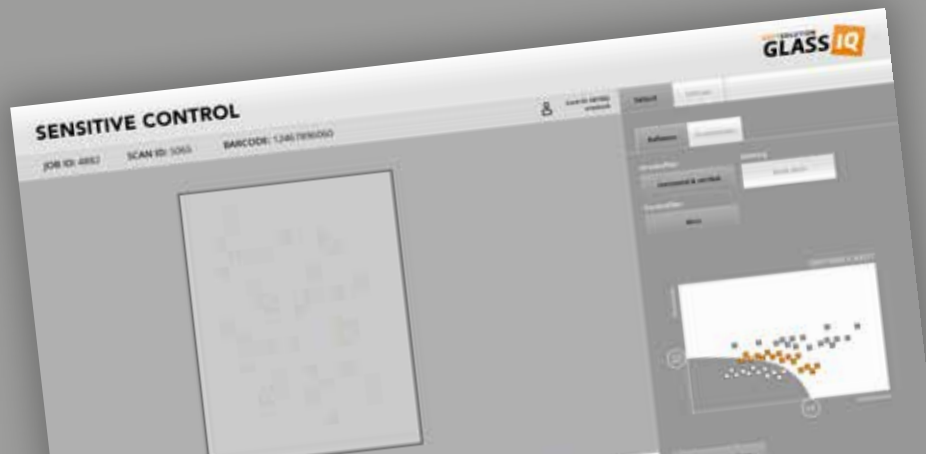
Features



Sensitivity setting



16-bit-technology



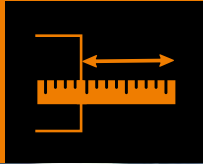
Different types of glass have different quality requirements. Using this knowledge, the LineScanner was equipped with a new technical function – **the sensitivity control tool**.

Here, slide controls are used to store individual quality settings that are then drawn on as a new quality attribute. The new function makes it very easy to specify which defects are to be made visible to the operator with the help of the LineScanner and which are not. This revolutionary new development now makes the LineScanner as easy to operate as a smartphone.

LineScanners from Softsolution have been equipped with **16-bit-technology** as standard since the beginning of 2016.

This innovative technology makes it possible to use considerably more grey shades (65536 instead of 256) than before. It allows defects to be detected even more easily, in particular in dark glass (from 15% light transmission), meaning that it is no longer necessary to define different assessment criteria for different levels of glass transparency. It is not just the installation of the LineScanner that has been made significantly easier for the operator, but also maintenance – quality degradation as a result of dust in the working environment is a thing of the past.

Features



Exact distance measurement



Available as an option to the LineScanner, the EDM system is able to give you exact dimension information of your piece of glass.



Accuracy +/- 0,25 mm independent of the glass length.



No other system within the glass industry - without any high accurate and very expensive transportation solution - allows to check the dimensions of a glass with such an accuracy.



Something you can only find for the LineScanner powered by SOFTSOLUTION.



Overall bending



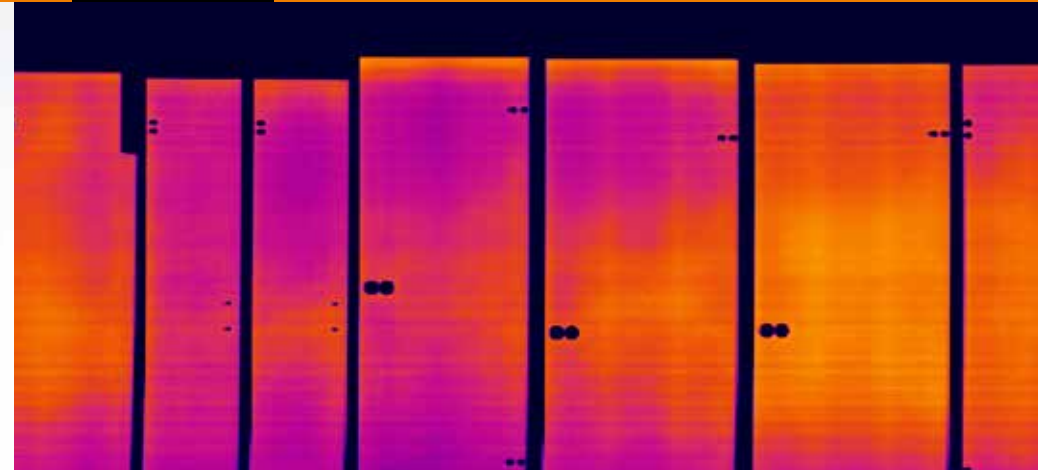
Checking overall bending is a brand new development to be implemented in the LineScanner. This technology can initially only be installed for vertical production lines. **Overall bending** is checked for in this case at a specific, configurable height of the glass. This function from Softsolution sets completely new standards since curved glass can cause considerable problems in a fully automated insulation glass production line (for example, cullets in the press, faulty sensor information, loss in the level of gas filling through "loosening" of the glass element at places along the frame, etc.).

Technical details

A sensor measures the distance between the individual sheet of glass and the sensor itself at intervals of 10-20 mm in the direction of transport. Measurement precision is very much dependent on how smoothly the glass moves along the conveyor. The maximum measurement tolerance is ± 0.4 mm. The sensor is freely configurable, the minimum distance to the conveyor unit being 300 mm.



Integration of thermal images

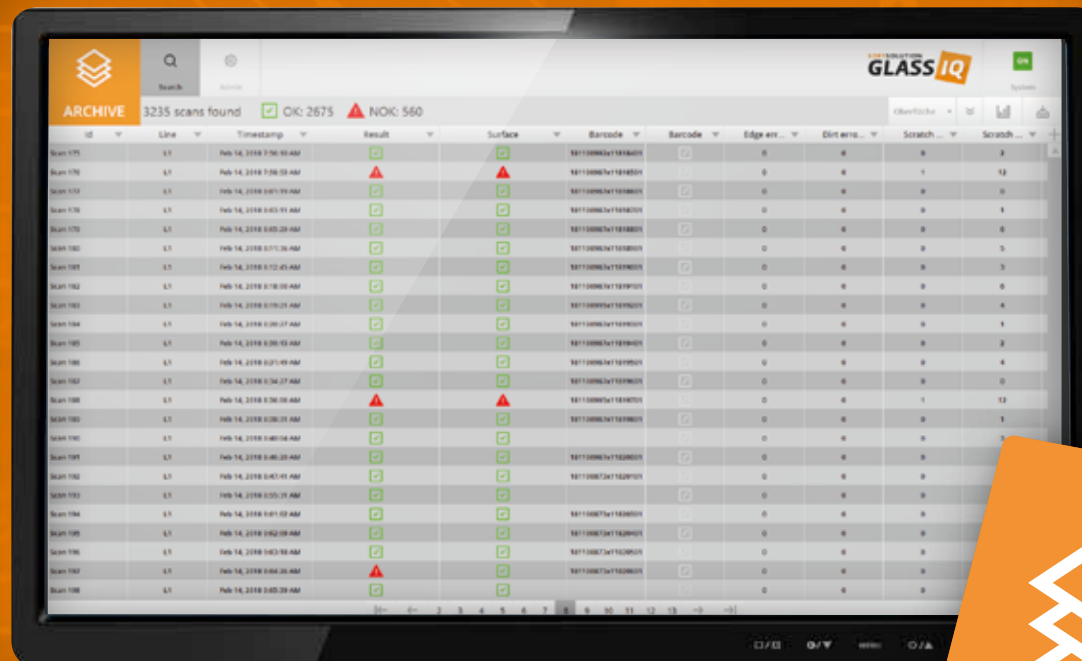


As part of the inspection regarding the quality of the anisotropy and edge stress, the LineScanner is able to also combine the thermal images from the additional thermal scanner.

By means of this exact correlation to specific lite geometries and the location of the lites in the batch, it is possible to conduct, among other things, a temperature distribution test. All of this data is combined and completely documented in the LineScanner archive.

ARCHIVE

100% DOCUMENTATION AND DECISION ON
ESTABLISHED BASIC DATA



ARCHIVE 3235 scans found OK: 2675 NOK: 560

ID	Line	Timestamp	Result	Surface	Barcode	Barcode	Edge area	Dirt area	Scratch	Scratch
Scan 1175	5.1	Feb 14, 2019 7:56:40 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1176	5.1	Feb 14, 2019 7:56:53 AM	✗	✗	821100007418100000	821100007418100000	0	0	1	12
Scan 1177	5.1	Feb 14, 2019 8:01:49 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1178	5.1	Feb 14, 2019 8:03:41 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1179	5.1	Feb 14, 2019 8:05:29 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1180	5.1	Feb 14, 2019 8:11:36 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1181	5.1	Feb 14, 2019 8:12:45 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1182	5.1	Feb 14, 2019 8:18:00 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1183	5.1	Feb 14, 2019 8:19:21 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1184	5.1	Feb 14, 2019 8:20:27 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1185	5.1	Feb 14, 2019 8:20:53 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1186	5.1	Feb 14, 2019 8:21:49 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1187	5.1	Feb 14, 2019 8:24:27 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1188	5.1	Feb 14, 2019 8:26:40 AM	✗	✗	821100007418100000	821100007418100000	0	0	1	12
Scan 1189	5.1	Feb 14, 2019 8:28:25 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1190	5.1	Feb 14, 2019 8:40:18 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1191	5.1	Feb 14, 2019 8:40:28 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1192	5.1	Feb 14, 2019 8:41:41 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1193	5.1	Feb 14, 2019 8:55:19 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1194	5.1	Feb 14, 2019 9:01:09 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1195	5.1	Feb 14, 2019 9:02:08 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1196	5.1	Feb 14, 2019 9:03:48 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0
Scan 1197	5.1	Feb 14, 2019 9:04:26 AM	✗	✗	821100007418100000	821100007418100000	0	0	0	0
Scan 1198	5.1	Feb 14, 2019 9:05:29 AM	✓	✓	821100007418100000	821100007418100000	0	0	0	0

SOFTSOLUTION

GLASS IQ

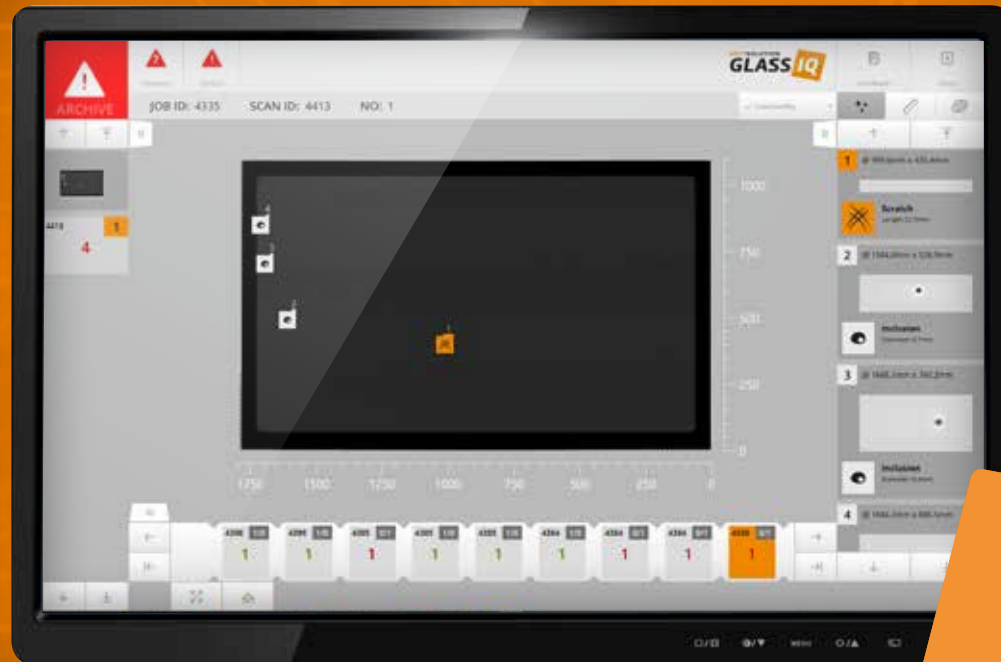


The LineScanner archiving software is a standalone application that can be used to search for specific glass items in the database (for example by customer, barcode, order number, line item number, etc.) and to then provide a visual representation of them. Moreover, the database can be used to analyse a number of different statistics (e.g. production figures, target-actual statistics, errors per defect category, etc.).



- Individual exports to Microsoft Excel
- Production control regarding quality and quantity
- Answers to:
 - a) What are the main quality problems?
 - b) What connections are there with previous processes?

NEW INTERFACE NEW DESIGN NEW PRODUCTIVITY



SOFTSOLUTION

GLASS IQ



Monitor image: Surface & Edge Quality



Monitor image: Anisotropy



Monitor image: Surface & Edge Quality



Monitor image: Surface & Edge Quality



Monitor image: Dimension control



THE NEW VIEW OF THINGS



CulletScanner

**Automatic fracture pattern analysis
with optional polarization function**

The CulletScanner from Softsolution scans every fragmentation image, whether architectural or automotive glass, with maximum resolution. Each fragment is viewed from a 90° angle and the entire fragmentation image of a test sheet is exactly and fully analysed within seconds.

The CulletScanner is able to completely analyse the entire fragmentation image of a test sheet within seconds. Every fragment is identified and gauged. Exclusion areas along the outer edge as well as the impact point are of course included. Every scan of a fragmentation image is stored with maximum

precision and definition. A printed certificate in PDF format is generated automatically showing all the analysis areas, additional information such as the relevant job, type of furnace etc. and of course an overall result.





Fully automated fragmentation image analysis for different types of glass



Precise calculation of length, surface area and weight of every single fragment



Capture of the longest, largest and smallest fragments – many standards available



Edge stress and correlation to surface tension (approximation)

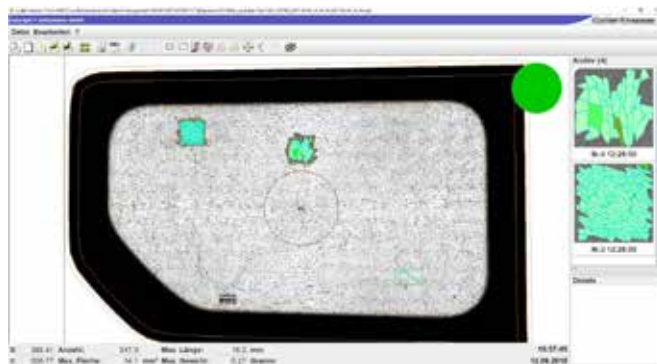


Anisotropy

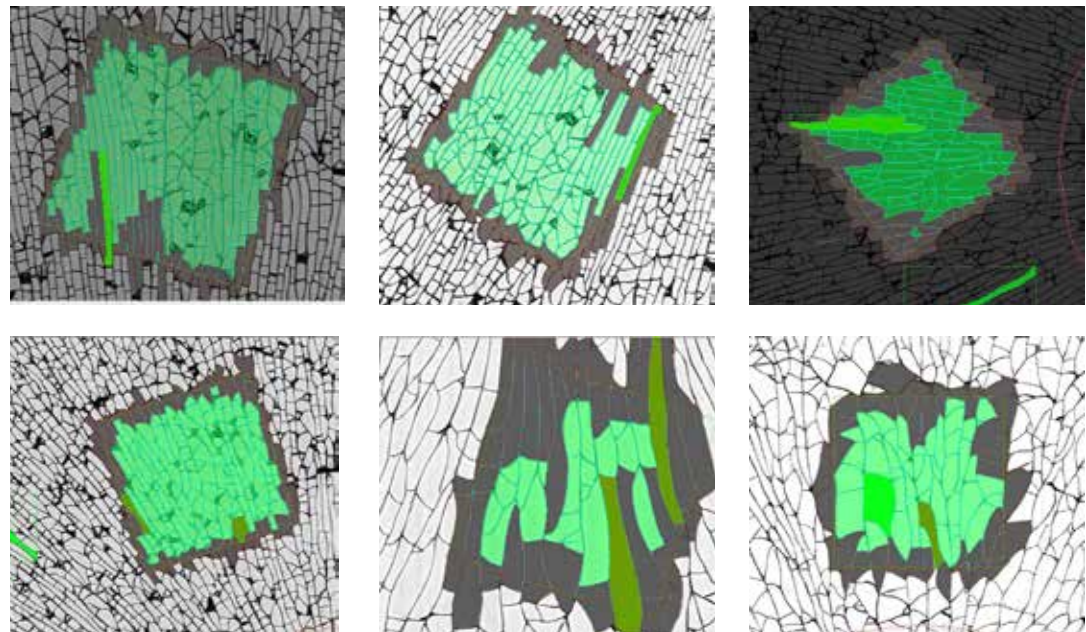
CulletScanner – automatic fragmentation image analysis

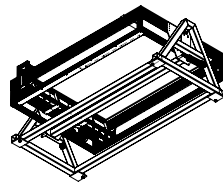
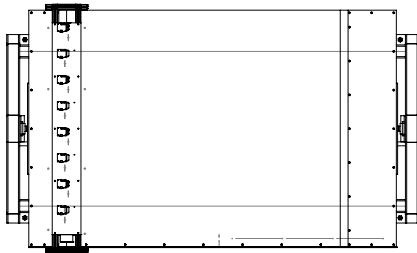
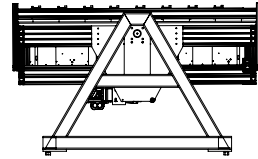
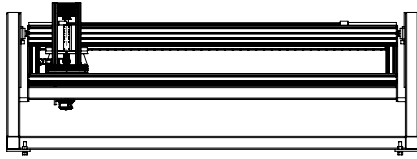
The CulletScanner analyzes the entire sheet and finds those areas with the most, fewest, largest and longest fragments fully automatically. These positions are highlighted and analyzed once more. The associated CulletScanner software provides all established, familiar standards in this field. (EN 12150, EN 1683, EN 14179, EN 14428, EN 31129.NFF, R 43, ANSI Z97.1-2004, CAN/CGSB-12.1M)

The status, position, size, length, surface area and weight are determined for every single fragment. The CulletScanner counts consistently, dependably and plausibly.



■ Fragmentation image analysis





Technical details:

- Individually configurable
- Standard table for glass sizes of 1100 x 360 mm
 - * The CulletScanner can also be manufactured in any custom size
- Inspection of individual sheets
- Glass must have transparency of 15 – 99 %.*
 - * Screen-printed surfaces, structured glass and glass items with a similar surface cannot be processed.
- Maximum scanning speed: 20 metres / minute
- Glass thickness: 2.3 – 20 mm
- Power supply: 230 V, 16 A, 50Hz, single phase, separate neutral conductor and earthing
- Operating system: Windows 7 or higher



Custom size depending on customer requirements with the options of an electrically driven scan bridge and a swivel-mounted scan table



Based on real scanning technology with up to 200 dpi resolution, high-resolution image archiving, and no age-related deterioration in the quality of image information



Certificate printing, automatic counting and analysis for each separate fragment



Data storage in the form of a CulletScanner project, digital storage, access for years



ALWAYS AS FLEXIBLE AS YOU ARE

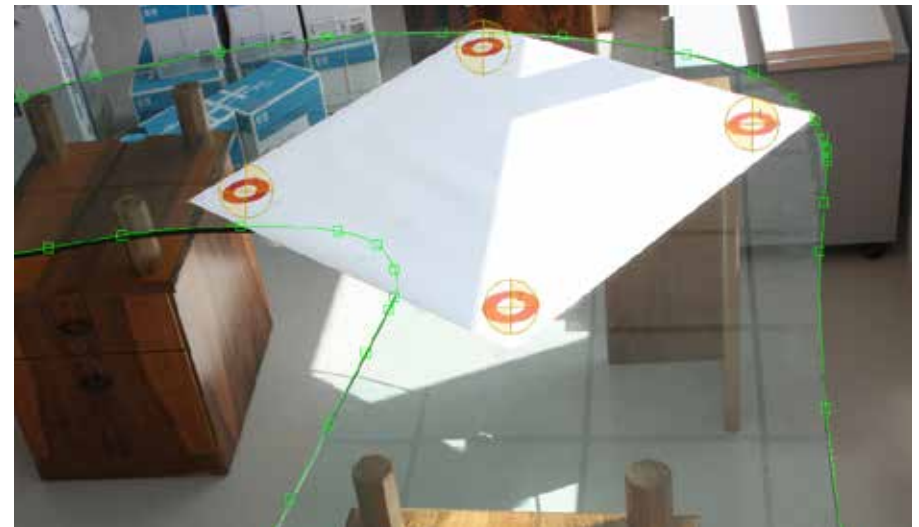


VirtualDigitizing

Digital object data capture
with maximum precision

VirtualDigitizing – a software application for flexible digitization solutions for templates that can be used easily and quickly in any industry without the need for a digitizing table.

This results in an unprecedented reduction in workload and increased flexibility. VirtualDigitizing – will change the way you work.



VirtualDigitizing



Fast and flexible digitizing solution for templates and 2D objects



Automatic conversion of your digitization to a DXF file



Seamless documentation and IT-based archiving of your templates

Three steps to your digital template

With the help of a calibrated digital camera, a reference measure and the innovative VirtualDigitizing software (which includes contour detection), you can convert any template/pattern/object into a DXF file within a very short amount of time (< 5min).

This allows templates/patterns/objects from a few millimetres to several meters in size to be easily, flexibly and rapidly digitized.



Image capture

Photograph the template you wish to digitize, including four reference points. These points with crosshairs form the basis for the exact calculation of the template. Plexiglas plates as well as standard paper sizes (DIN A4, A3, A2, etc.) can be used to provide the scale – making Virtual Digitizing also suitable for small measurements on construction sites.

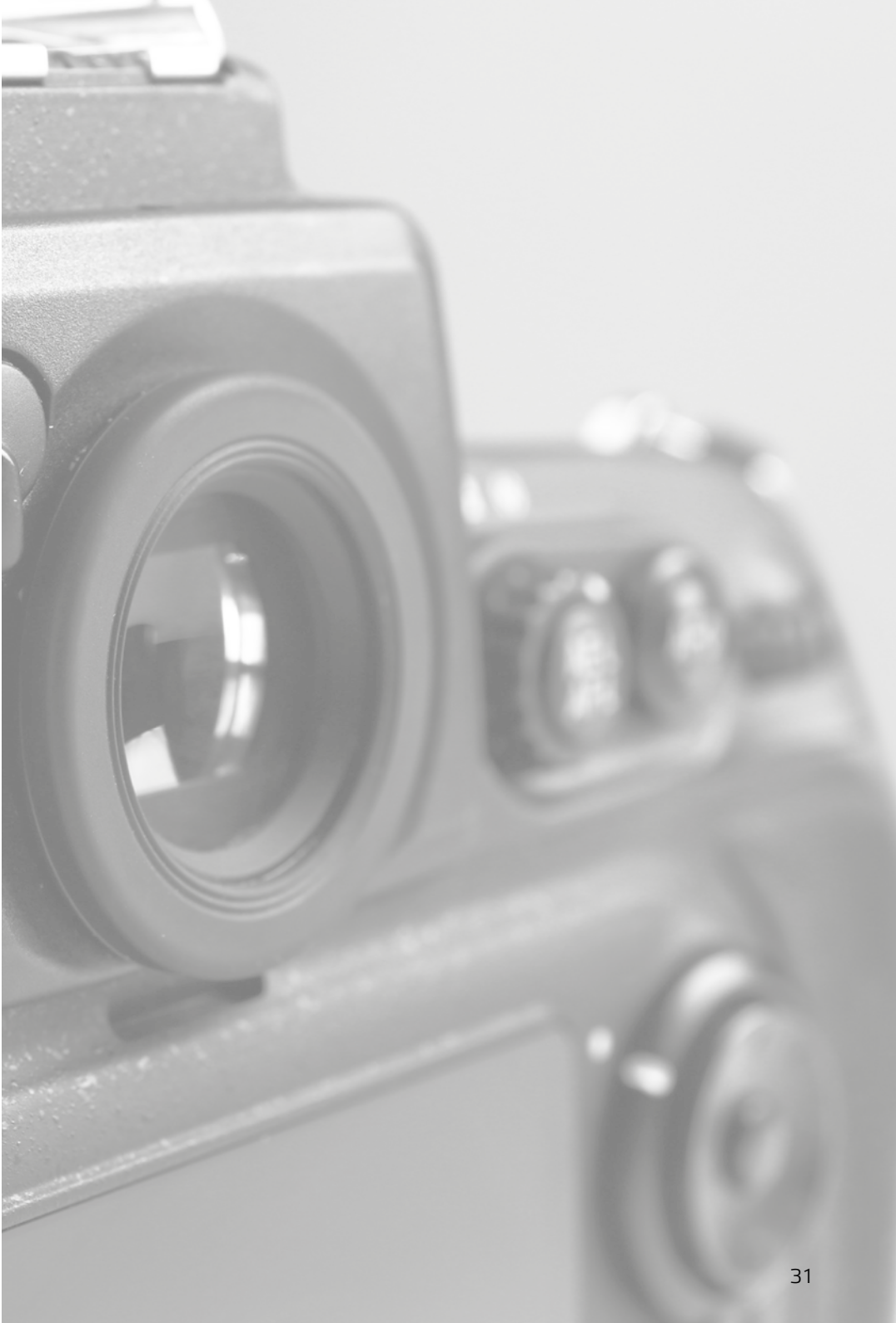
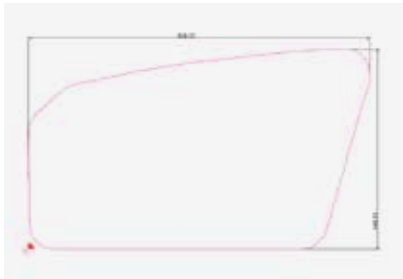
VirtualDigitizing

The digital image generated can be opened in the VirtualDigitizing software with a single click. Thanks to the high degree of user-friendliness, markings at the stencil edges, as well as optional drill holes or cut-outs, can be defined manually or automatically.

Digital template

VirtualDigitizing generates a high-precision, accurate DXF file that can be forwarded to all types of cutting equipment and to production immediately. Automatic contour smoothing means that no further editing is required before cutting. It can be used in all areas of production from the glass industry to water jet cutting.

Examples:





More than
450 LineScanners
worldwide



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