

FLAT GLASS QUALITY
CONTROL SOLUTIONS

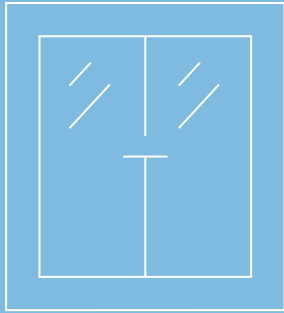




we see it



Born to innovate



Born in 1989 as spin-off of the research center known as Fondazione Bruno Kessler, Deltamax boasts many years of experience in the development of artificial vision solutions for quality control in the industrial sector. **Since 2010 we have devoted our time to float glass quality control by developing cutting-edge solutions thanks to continuous our investment in Research & Development.**

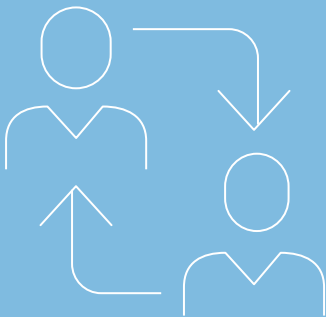
International Network



Working with Deltamax means setting foot in an international network, with solutions operating in over 5 continents.

Anywhere in the world we can offer the experience of our qualified partners along with the reliability and customization of our systems. Our products will become indispensable equipment for obtaining the necessary quality level requested by customers in the market today.

The strength of a group



Since 2017 **Deltamax has become parts of the Delta Informatica group**, a point of reference for ICT in the north of Italy. The common goal is to support the continuous growth of the inspection solutions application, with a more structured organization ready to face the new challenges that the markets propose.

A step forward



We operate in different market sectors with the same overall goal in mind, that is the improvement of the effectiveness and efficiency of production cycles. We believe excellence originates from the full control of operations: **that is why we work hard to support our clients in implementing increasingly innovative, flexible and customized technologies.**



CUTTING LINES SOLUTIONS

The complex production of float glass involves the presence of structural defects in every sheet, defects that cannot be repaired. This results in significant costs that relate to waste management and client disputes.

With a mission to make the whole float glass transformation process more efficient, Deltamax has developed OPT, the innovative solution destined to change the glass sector. **It can detect defects before each processing without having to wash the sheets and guarantees numerous advantages and a quick return on investment.**

Sustainable quality

Thanks to the interface with cutting software for the optimization of the cutting program, glass waste and energy consumption will be considerably reduced. The same will apply to machinery wear as no defective sheets that should be discarded will be processed anymore, thus making our solution **ecofriendly**.



ENHANCE YOUR PRODUCTION CYCLE

From the very initial stages the system has been conceived to be versatile and flexible enough to easily adapt to any cutting process without needing any alteration.

Easy to install, **OPT** requires limited line stop as well as reduced maintenance.

OPT inspects glass sheets during the transit from the loader to the cutting. The software elaborates the image, detects its defects (bubbles and inclusions) and excludes those of acceptable dimension. **Clients have full control on the minimal dimension parameters they wish to assign to defects.**

OPT makes it possible to waste just a limited area around the defect, instead of the whole sheet. Only sheets without defects will proceed with further processing. This will reduce machinery wear, the whole processing time as well as the need to cut again defective sheets.

ADVANTAGES



Detects structural defects such as bubbles and inclusions in **monolithic and laminated glass**



Reduces the glass refuse area because defects are placed in the shrinkage areas provided by the cutting pattern of each sheet



Compatible with the cutting table for fully automatic management



Saves energy and prevents excess machinery wear because non-compliant sheets will not be processed

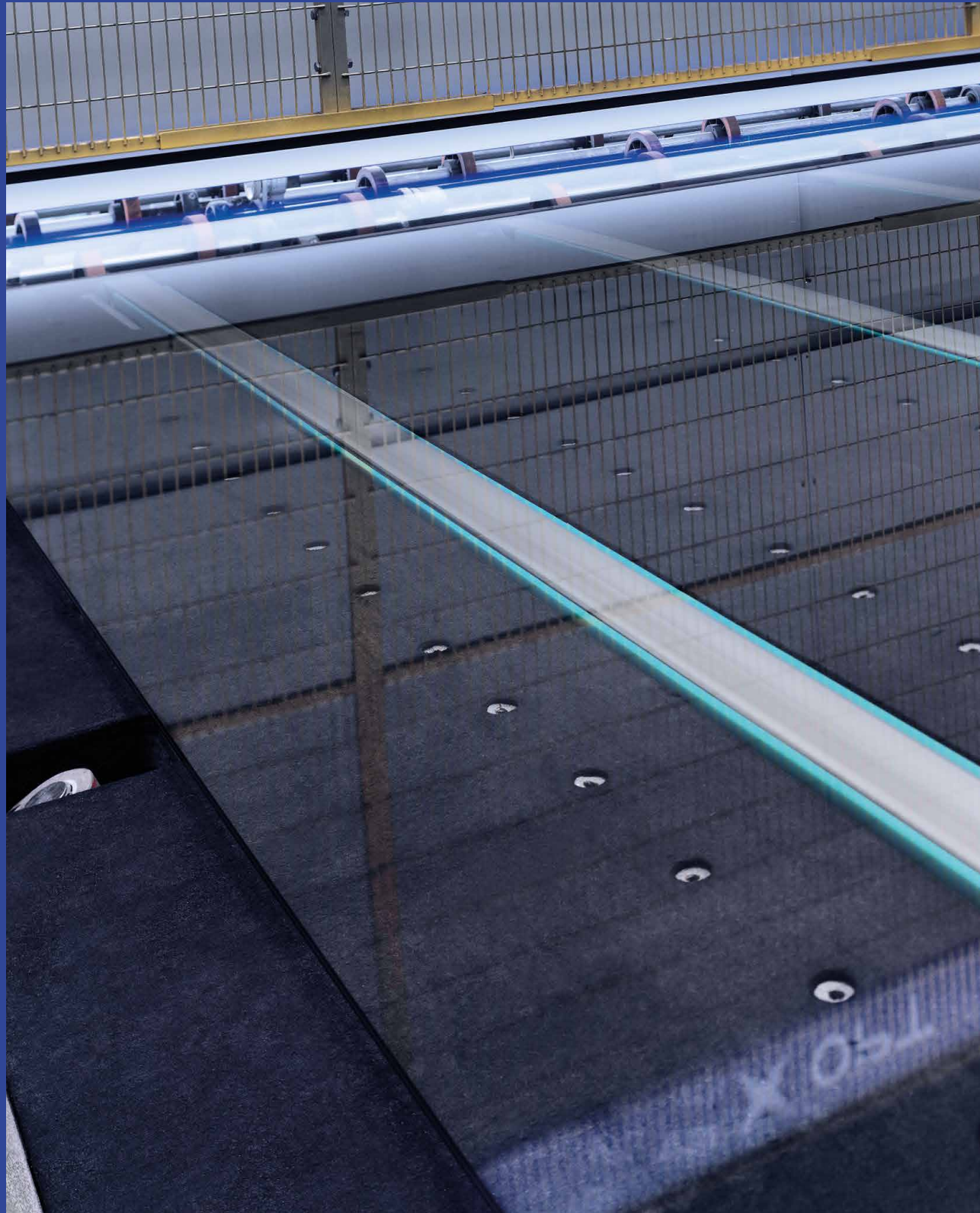


Checks unwashed glass sheets before starting the cutting process



Rationalizes cycle time thanks to reduced waste on the line and increased time saved for their management







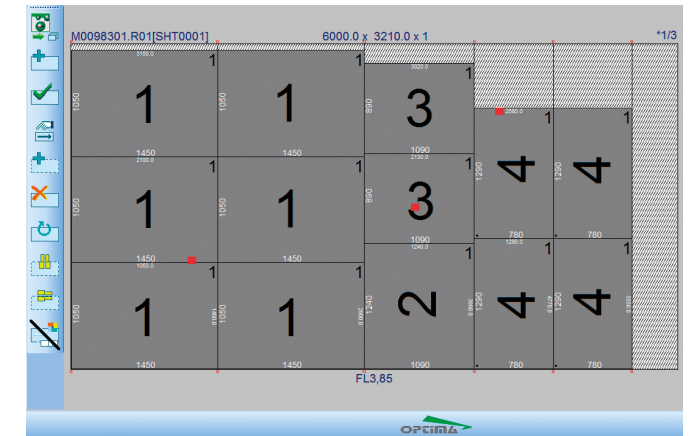
TECHNICAL FEATURES

- Can work with any kind of transparent glass, apart from sandblasted, mirrored, frosted sheets.
- Usable with both regular and jumbo format, but also, with different various widths.
- Images resolution: 0,2 mm\pixel.
- Minimum dimension of detectable defects: 0,4 mm.

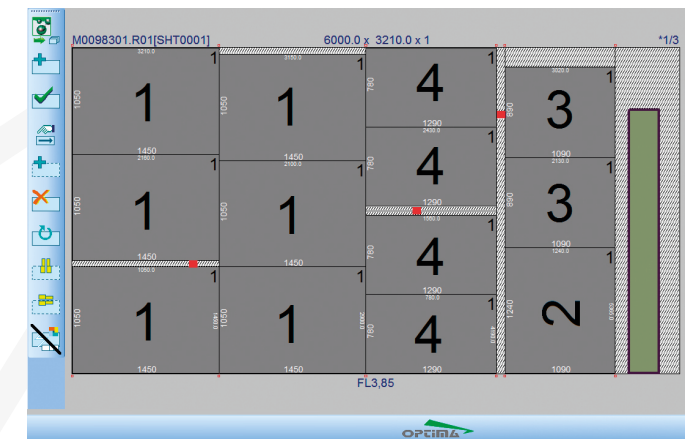
DETECTABLE DEFECTS

-  Structural defects (bubbles, inclusions)
-  Scratches that affect the glass surface

DETECTED DEFECTS ON CUTTING PLAN



OPTIMIZED CUTTING PLAN



Example of optimization with Optima software.

IG LINES SOLUTIONS

The high demand for insulated glass by the building industry with increasingly larger, high-performance windows in terms of acoustic and thermal insulation has resulted in demand for higher quality, as close as possible to a “zero defect” result.

Deltamax has followed this trend by constantly improving its solutions which have multiplied to meet the different needs over the time and which can now be installed in various places along the production line. The extreme care devoted to the design phase has made it possible to combine simplicity of installation, maintenance and use with a high level of customization. System parameters can be programmed according to the desired quality level of defect evaluation, so that every scanner becomes an invaluable support to production quality improvement.

In the name of innovation

Being the first company ever to engineer a functional solution for defects control in IG lines as well as the first designer of a scanner for defects detection such as halos, Deltamax is now a leader in the supply of technologies for supporting workers, such as augmented reality.



GLASSINSPECTOR

A MUST FOR A MODERN GLASS FACTORY

Over 100 satisfied clients across the world are proof of the versatility and reliability of GLASSINSPECTOR. Developed in 2007, this technology has constantly evolved to meet different needs, thereby improving its defects detection performance to the highest levels, for example at the time of replacing the only component subject to wear, the lighting unit. This is the result of Deltamax's mission to seek an innovative solution that could also be applied to previously installed products.

ADVANTAGES



Automatic adaptation to different glass colors or transparency degree



Defects classification



User-friendly interface



Modularity to facilitate subsequent upgrades



Procedures for the management of different quality levels



Versatile technology as it is independent from the production line



TECHNICAL FEATURES

- Can work with any kind of transparent glass (including low-e, selective and colored paste glass).
- Can inspect any glass shape.
- Image resolution: 0,2mm/pixel.
- Minimum dimension for defect detection: 0,4mm/pixel.
- Maximum thickness for defect detection: 50mm.
- Maximum line speed: 60mt/min.

DETECTABLE DEFECTS



Glass defects:
bubbles, inclusions, knots



Process defects:
scratches, stains, prints



Coating defects:
holes, abrasions, scratches, burns





EVOLUTIONARY QUALITY WITH DOUBLE INSPECTION

Released in 2019, **Q+** represents a considerable step forward in the world of glass inspection systems, as it has defined a new standard in the field of flat glass defects detection.

Q+ integrates two different technologies of inspection in one solution: the standard system potential is improved by a second inspection channel which **dramatically increases the capacity to detect superficial defects, such as halos.**

ADVANTAGES (as compared to GlassInspector)



More precise and sensitive in the detection of defects



Double inspection channel with a single camera array that guarantees performance at an affordable price



TECHNICAL FEATURES

- Integrates two systems in one solution, by improving the standard system with a second inspection channel.
- High precision in detecting the most difficult defects such as halos, slight stains, roller scrapes on tempered glass, thin scratches.
- Makes it possible to customize parameters for each defect class.
- Does not slow down production thanks to the new 64-bit technology.
- The Production Analyzer software enables the processing of the data collected by the scanner to obtain production statistics, personalized reports and an insight into the different defect categories identified.

DETECTABLE DEFECTS

(in addition to the defects detectable with GlassInspector):



Halos cause by water / incomplete drying



Remains from insulated tape, oils or other substances.



Halos caused by the tempering process



Prints or light stains



Prints of suckers in laminated glass



Thin scratches

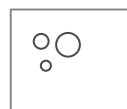


IGU SCANNER

IG UNIT CONTROL

Any manufacturing company's goal is to certify the quality of a finished product and of the whole production line before delivering it to the client. The entire IG production sector has undergone incredible innovation which has resulted in a great variety of finished products, made of different types of glass and of spacers. **Thanks to the IGU Scanner, Deltamax can offer a versatile solution for the control of single, double and triple glazing.**

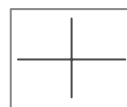
CONTROLS CARRIED OUT



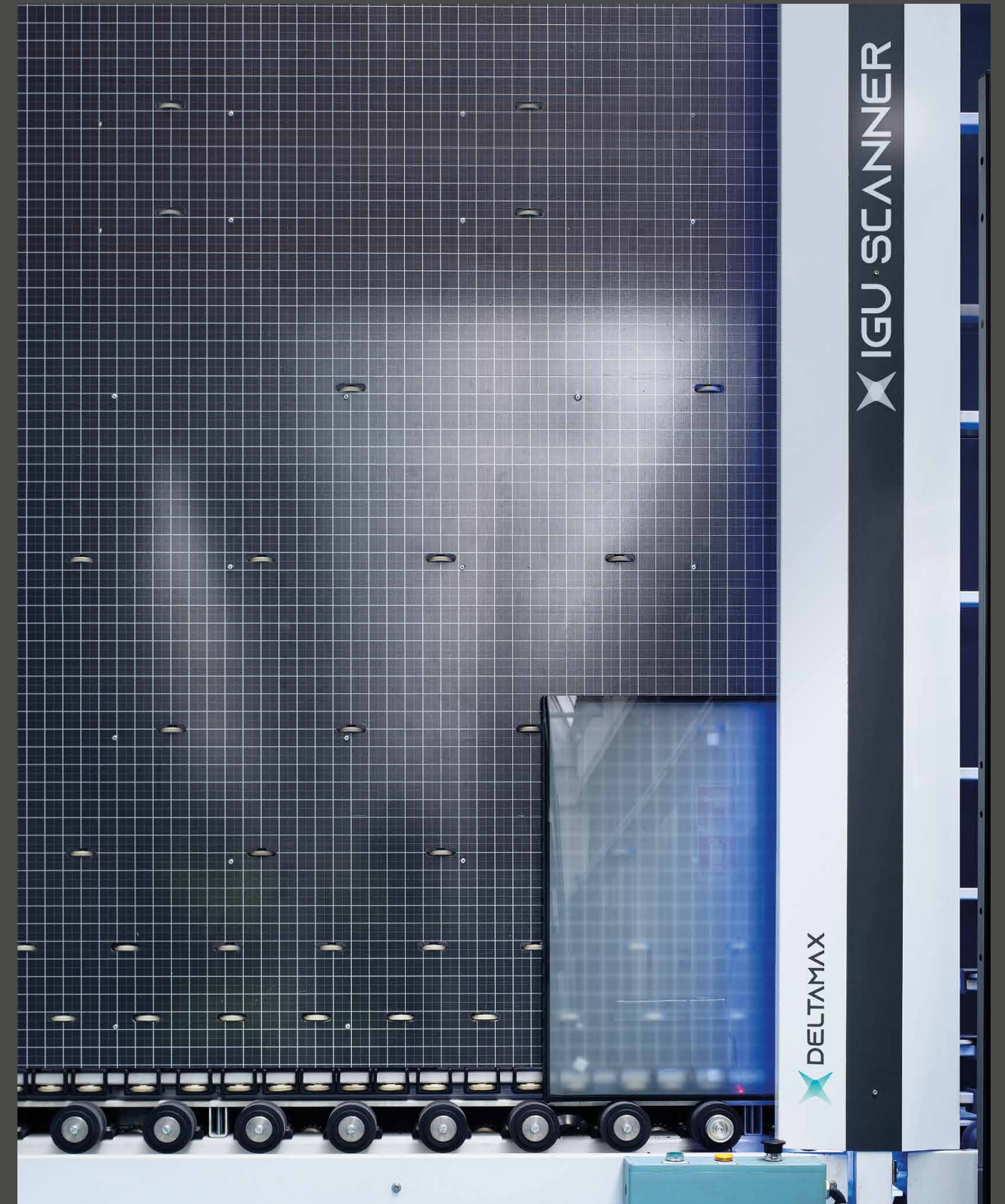
Visual defects in the transparent area, or detection of bubbles, inclusions, scratches, dirt, remains of various kinds including butyl



Correctness of the spacer position, i.e. detection of bulging or out of square



Correctness in the laying of the Georgian bars, comparison with the drawing for the verification of the position as well as of the offset between the bars and the offset between the single glazing

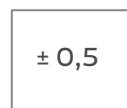


✦ PROFILER

SHAPE AND DIMENSION DETECTION

Modern IG production lines require increasingly high automation in order to reduce both human error and cycle time. With this in mind, Deltamax has developed **PROFILER**, a scanner which can detect glass dimensions and outline. Thanks to a dedicated conveyor which guarantees great precision, the system can compare the actual sheet detected with the one expected by the processing board, thereby sending the updated information to the production line.

CONTROLS CARRIED OUT



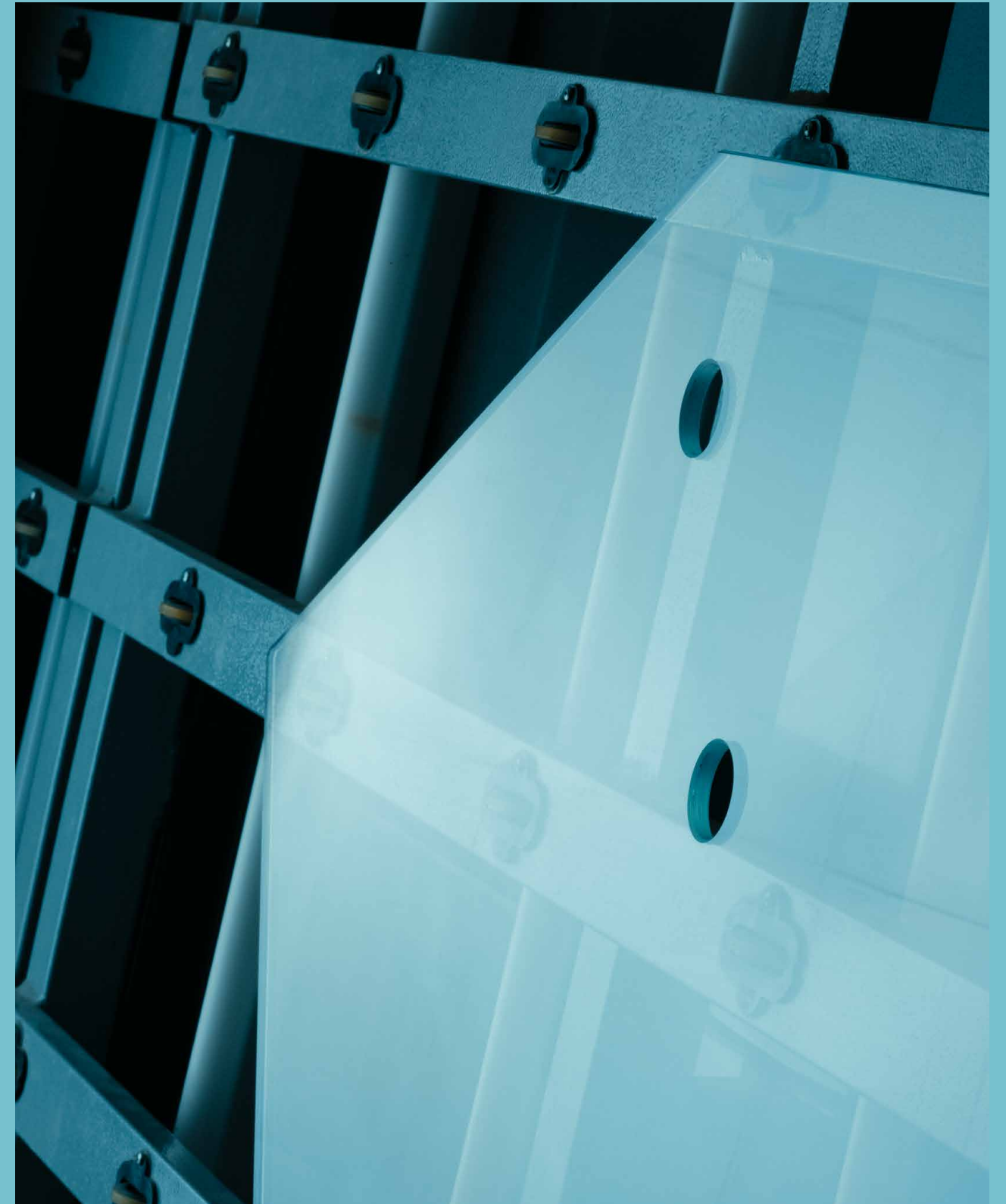
Precision in the detection of outlines\processing: $\pm 0.5\text{mm}$



Shape and processing check, with comparison to a dxf (or similar format) file



The system works well on unwashed float glass too. For this reason it can be placed before the line to detect the glass dimensions and pass them to the line machines. On washed glass for example, the outline detection function activated before entering the storage system may be combined with quality control, thereby maximizing the production cycle



SOLUTIONS FOR FLAT GLASS CONTROL

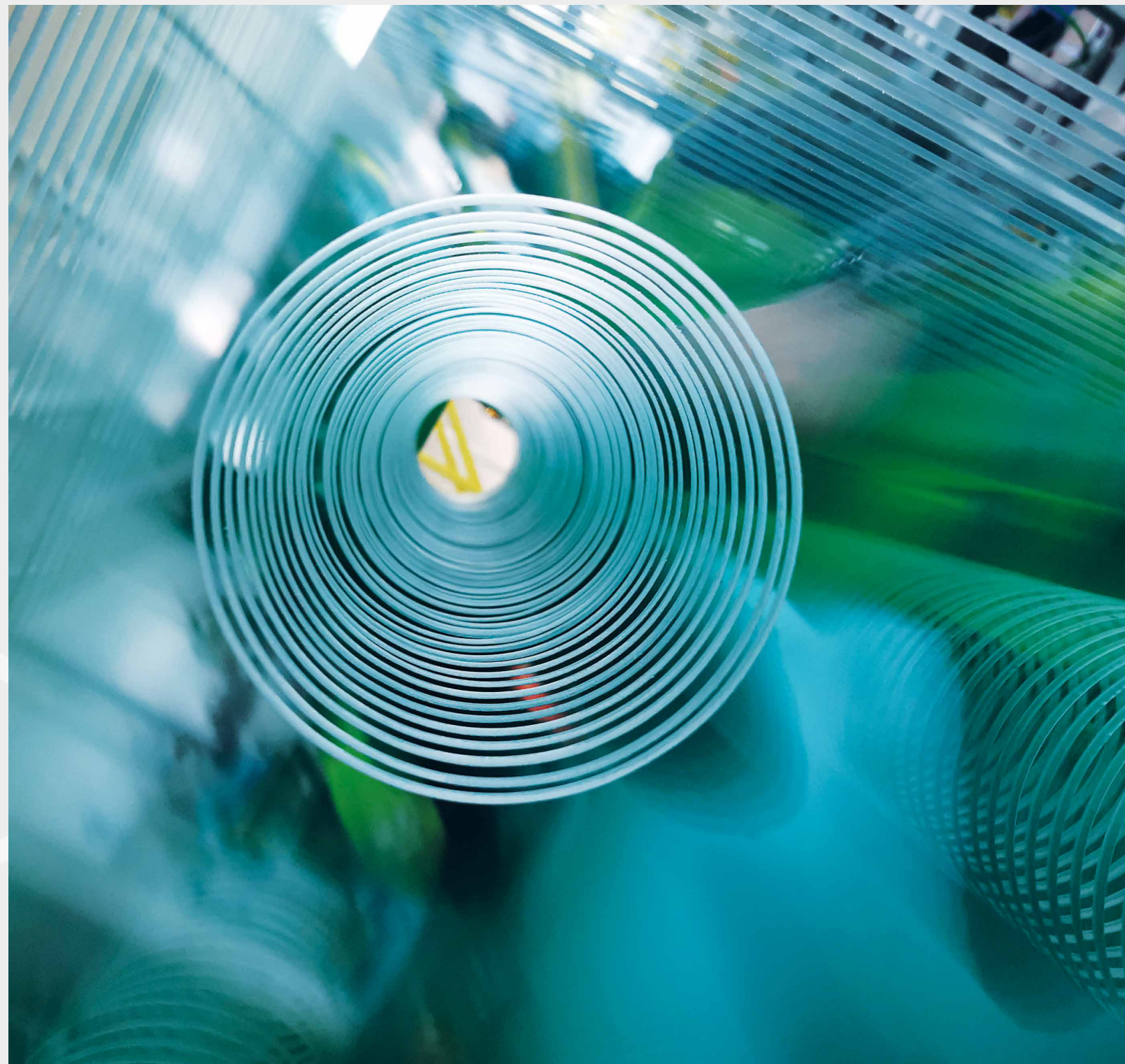
The increasing speed in modern manufacturing systems makes the use of technology indispensable to ensure accuracy in the single production processes and the quality of the finished product.

This is no less true for float glass production and processing lines. The level of automation has considerably increased over the years, thanks to the technological innovations which guarantee high performance together with simplified configuration and use.

That is the case of EVO, the most flexible and comprehensive solution for float glass inspection which be easily adapted to any production line to carry out accurate controls which can even be combined one with the other. In addition to defect detection, **EVO** can analyze the sheet printing, outline, dimensions and processing.

Integrated systems

Serigraph, dimensional, processing quality controls of the sheets must usually meet very high standards. For this reason Deltamax, together with its partners, has developed dedicated solutions for glass movement.





QUALITY CONTROL FOR EACH NEED

A standard but highly customizable solution. It may sound like a contradiction but that's the perfect description of **EVO**. **The system can easily adapt to various defect detection needs by changing the number and type of video cameras or lighting unit while at the same time being based on a reliable and well-tested software** enabling clients to choose among different quality levels by setting different parameters. Thanks to the interface with the production line and with the different ERP softwares, **EVO** is fully integrated with the production line thereby improving its automation.

ADVANTAGES

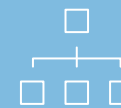
The scalability guaranteed by the system enables clients to obtain the best quality/price ratio, while still giving the possibility of a hardware and software upgrade to increase performance and functionalities at a later stage. **At Deltamax, we carefully support our clients: thanks to selected and accurate investments, we become a strategic partner for their gradual improvement in quality.**

TECHNICAL FEATURES

- Defect detection on glass, coating, printing, sheet edges.
- Highly customizable: clients can set different levels of quality and control parameters.
- High adaptable to any production line, be it horizontal or vertical, small in volume and with minimal maintenance.
- Can interface with the production line e.g., can manage an automatic discard system of non-compliant products.
- Can save results and defect images.
- Can generate personalized statistics and production reports.
- Offers a full support and software update service.



DETECTABLE DEFECTS



The high customization degree permit to adapt the sensitivity of the control, changing both the type and/or the minimum dimension of the detectable defects. Thanks to this characteristic, Evo could be installed on any processing line to improve the quality of each process, from lamination to tempering.



EVO is so versatile that it includes mirror quality control among its possible variants. The solution is solid and is not affected by vibrations during sheet handling and at the same time guarantees high performance in defect detection (essential for perfect cleaning of surfaces).



DIMENSIONAL CONTROL

The increasing use of glass in various sectors with an increasing demands of non-conventional shapes has resulted in more and more meticulous processing of the sheets. **Particular outlines request high levels of precision in processing if they are to become part of complex products.** The speed of modern production together with the peculiarity of processing often make human control impossible to perform, thereby we must rely on automated systems.

CONTROLS CARRIED OUT



External dimension control



Hole position and diameter control



Shape control



Processing control



PRINTING CONTROL

The use of glass in particular sectors, such as the automotive, household appliance or interior design industries, has dramatically increased the use of serigraph or digital printing in glass production processes. **A careful and precise quality control is a time-demanding process which is hardly compatible with the cycle times of the production process and requires the use of optical systems enabling the detection of repetitive irregularities due to machinery wear or damage.**

BLACK BAND CONTROL

- ✓ Completeness
- ↻ Position and rotation
- ✂ Scatches, void or lack of ink detection

LOGO CONTROL

- ✓ Completeness
- ABC Position and rotation
- Ⓜ Character legibility
- ⋮ Presence of traces
- 💧 Drop of ink in the transparent area





FRAGMENTATION ANALYSIS

The glass tempering process is subject to multiple variables which can affect the quality of the final product dramatically. **In order to guarantee meeting the security standards, unceasing control is necessary, along with the filing of images and data to certify it.**

To simplify this demanding process, Deltamax has developed **FROG**, an accurate and easy-to-use and handle solution.

The unit, containing the whole system, is light and compact and can be connected to any PC. The dedicated software allows for the choice both desired safety standards among the available ones on the system database and of the requested area to be analyzed (dimension 5x5 cm). Hence, you can obtain a result indicating the extension to which the standards are met, number of fragments expected and features of the biggest one, their distribution in terms of quantity, dimension, etc. **All the data are filed on a PC and contribute to the drafting of reports, which can be personalized or integrated with other data that can be entered via the interface.**

TEMPERCHECK

In order to provide an answer to the most demanding markets such as the USA, **FROG** has evolved into **TEMPERCHECK**, which also adds to the features an **evaluation of the weight of the 10 largest fragment.**

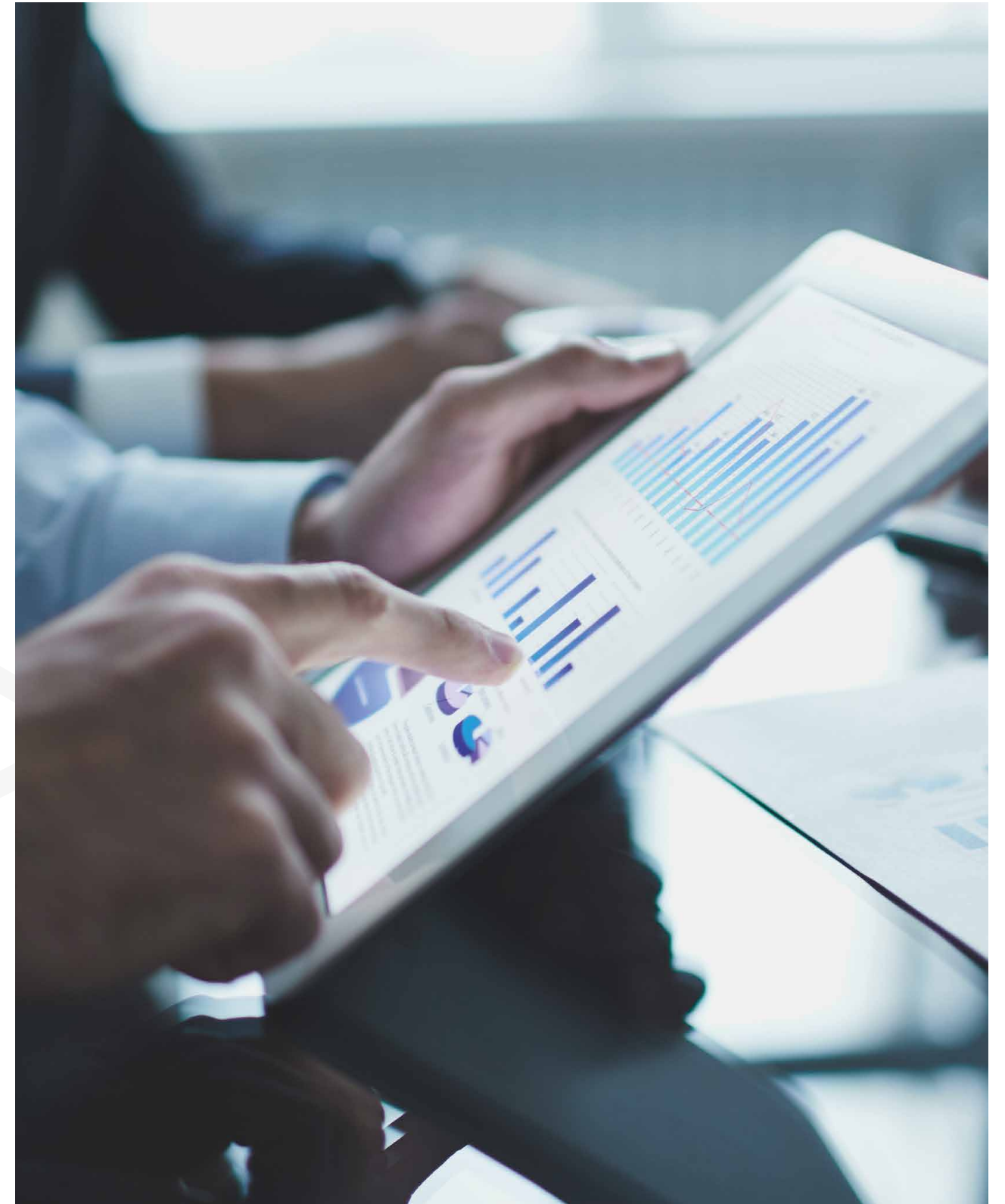













































PRODUCTION ANALYZER

An effective quality control system ensures the identification and discard of faulty products while trying to correct defects. **By analysing the data collected by one or more scanners, clients will be able to understand the cause of defects and hence rearrange the manufacturing cycle with planned maintenance operations which will reduce non-compliance and optimize the entire production cycle.**

Production Analyzer will enable the filing of data and images collected by one or more scanners and will make them available to different workstations via the client's local network. Several different control functionalities will be available, including on production progress, line productivity, system features, e.g., quantity of light emanated, an essential element to guarantee the correct functioning of the system.

Production Analyzer can be used with each inspection solutions developed by Deltamax.



PROCESSES						SECTORS
	CUTTING	PROCESSING	PRINTING	TEMPERING	COUPLING	
						ARCHITECTURAL 
						REFRIGERATION 
						INTERIOR DESIGN 
						APPLIANCES 
						AUTOMOTIVE 
CONTROLS						DEFECTS DETECTION 
						DIMENSIONAL CONTROL 
	 INK MARKS					PRINTING CONTROL 





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