modulo ONE

Cosmetic surface inspection

CSI modulo ONE
FIRST FULLY-AUTOMATED COSMETIC INSPECTION

SCHNEIDER

Fascination for Innovation

M◯dulo Line

SCHNEIDER had the vision to manufacture individual lenses based on freely definable mathematical descriptions.

The HSC generators and CCP polishers have become the tools used to develop the freeform idea. Individual freeform lenses are now the top product in the market, and SCHNEIDER has grown to be the premier equipment manufacturer worldwide. The innovative machines have also made their way into standard Rx production, leading to higher productivity and quality of virtually all lenses surfaced today.

The next step is a highly integrated system solution: SCHNEIDER's Modulo Line.

Following a new self-organizing philosophy, the cognitive machines manage the production flow all by themselves – fully self-sufficient. The result is an unprecedented level of equipment utilization and unmatched throughput.
Designed for utmost flexibility, the unique arrangement and plug-and-play connection allows adding new modules in any order, with minimal disruption.

The Modulo Control Center interacts with the intelligent machines and provides centralized production control. At a glance, the smart dashboard presents all the key information and functions to run the lab at highest efficiency. Significant cost and time savings as well as maximum equipment utilization are guaranteed.
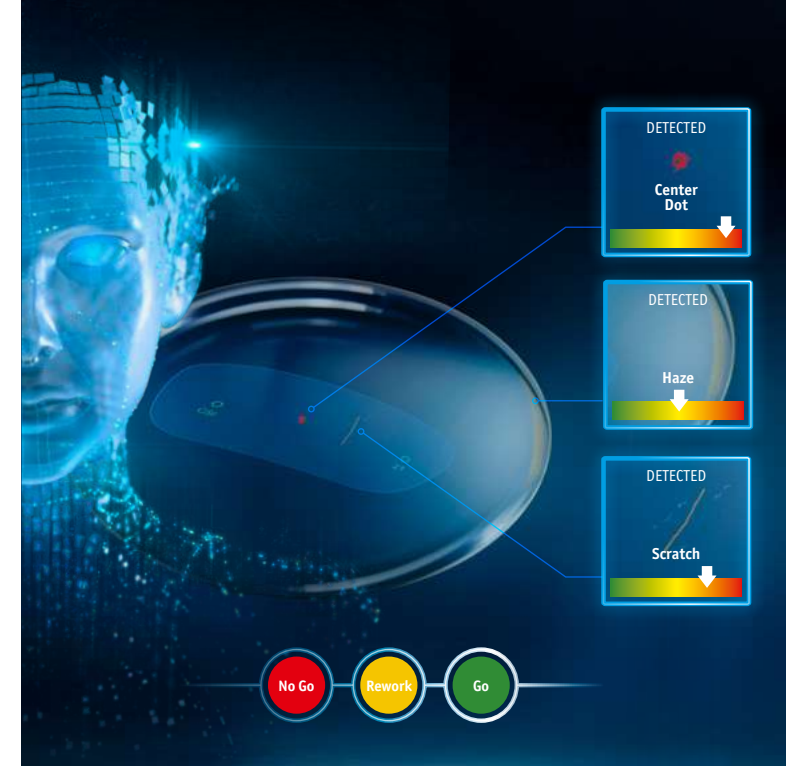
Reliable evaluation
A system that sees what only the human eye can see.

Mimicking your decisions
Artificial intelligence decides in the labs' best interest.

Adjustable standards
Reflecting the labs' unique quality standards.

DETECTED
Center Dot

DETECTED
Haze

DETECTED
Scratch

No Go   Rework   Go

CSI m◯dulo ONE

For the first time, a system sees what only experts see: CSI Modulo ONE reliably detects cosmetic defects fully automatically and absolutely dependably, at the highest level. The optical system screens the surface for irregularities, and characterizes and evaluates them with the help of artificial intelligence (AI).

It detects any common defects such as scratches, pits, center dots, haze, chatter, cutting marks, spiral and fringes. Automated cosmetic surface inspection guarantees consistent, objective evaluation. Unbiased. 24/7.

And the best part: the smart system mimics individual decision making patterns to reflect the labs' unique quality standard. All labs have to do is teach the system by feeding it decisions. This way, CSI Modulo ONE knows what constitutes a go or no-go. It understands what kind of defect(s), in which combination, in what intensity and in which zones, is deemed acceptable.

Labs can implement the same quality routines across locations to guarantee the same standards everywhere. Apart from this, labs can also opt to apply differing standards depending on the demands of the product or brand produced.
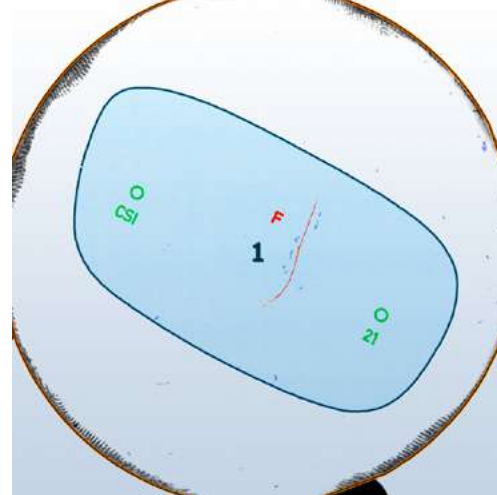
The result: A system that makes decisions just like you would make them – because you taught it.

In just a few seconds the lens is picked up, checked and brought back to the tray.
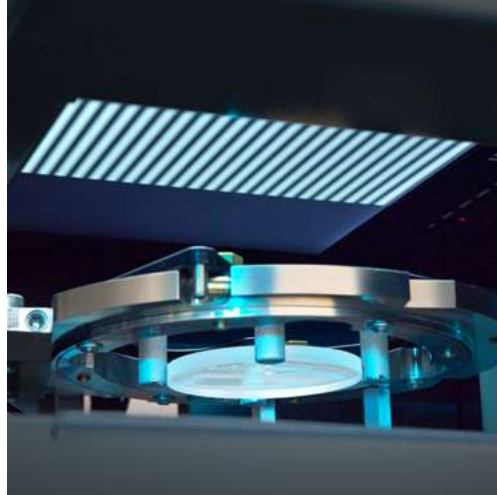
The camera-based system captures the information that serves as the basis for the artificial neural networks' decision making.

The system reliably recognizes defects, classifies and rates their intensity to ultimately decide: Go or no-go.

Automating the impossible

To date, cosmetic surface inspection has been a strictly manual process. Only skilled human eyes have been capable of picking up defects to ultimately assess if the quality is in line with a labs' standards.

The downside: This eye tiring work has been inherently difficult to standardize. Individual assessments vary greatly depending on factors like varying skill levels, differing subjective perceptions and their performance level on a given day. Whatever general guidelines have been defined, different persons assess differently.

CSI Modulo ONE automates cosmetic inspection. The camera-based system relies on artificial intelligence to detect any common defects and mimics human decision making. With the system, labs can control optics against the same consistent standards.

Pattern recognition powered by AI

The camera-based imaging system captures various configurations to analyse the lens surface. Next, artificial neural networks sift through the data applying myriad algorithms and mathematical routines with hundreds of parameters to detect irregularities.

If divergent regions are identified, pixels are combined and features are extracted. Finally, classifiers rate the intensity of defects for go/no-go decisions.

Setting up the system in 1-2-3

Setting up the system to mimic a labs' individual decisions and quality standards is an easy three step process.

1. At the beginning, labs individually define more or less critical quality zones on the lens e.g. the finished lens shape or standard zones.

2. Afterwards, labs define individual intensity thresholds for a number of defects on scales in line with what they consider irrelevant, weak, medium or strong defects.

3. Ultimately, labs feed the system go, no-go or rework decisions. Based on this, the AI knows what kind of defect(s), in which combination, in what intensity and in which zones, is ultimately deemed acceptable or not.

Apply the same or varying standards

Labs can easily apply the same quality standards even across locations to guarantee consistent decision making everywhere. At the same time, labs may opt to apply different logics for different
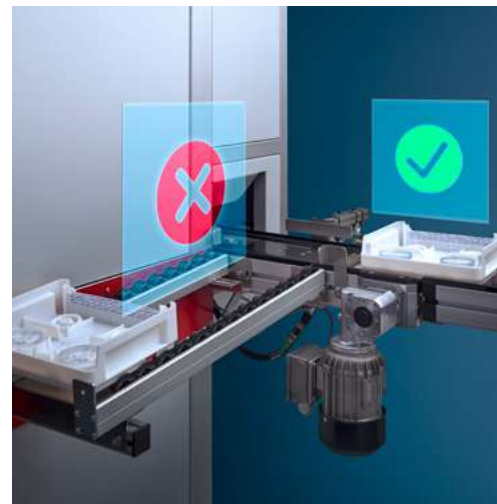
products and brands in accordance with their diverse quality demands.

For fast setup, labs can start off with a preconfigured system featuring ready-made logic that is based off a set of global parameters. To reflect changing standards, the settings can always be tweaked or adapted.

The Modulo advantage

CSI Modulo ONE comes with an on-board global interface philosophy that allows connection to the Modulo system. Once connected to the Modulo system, the machine works as an integral part of this one-of-a-kind solution and is subject to the centralized monitoring Control Center. The lab manager is fully informed about the current status of the machine. Therefore, critical situations and downtime can be avoided before they arise. Higher uptimes and increased yields are assured.

Benefits

Individual quality standards

Highly reliable, objective decisions

Consistent evaluation

Options for differentiation

Validation of engravings and mold markings

Adaptable and scalable

Available 24/7

technical data	
lens diameter	up to ø 85 mm
lens thickness	up to 45 mm
material	CR39, Hi-index, Polycarbonate, Trivex®, Tribrid™
measurement range	+/- 18 diopters
power consumption	0,4 kVA avg.
air requirement	6 bar (87 psi)
weight machine	approx. 420 kg (926 lb.)
dimensions without control panel (width x depth x height)	approx. 1698 x 1228 x 1794 mm (67 x 49 x 71 inches)

All data subject to change without notice. Please verify details with SCHNEIDER.

SCHNEIDER

We are one of the world's leading suppliers of processing solutions to the ophthalmic and (ultra-)precision optical industry. Founded in 1986 our company is known as the pioneer of freeform and setting the pace. We are distinctive for our development of new technologies and swift translation of technological concepts into customer-oriented innovations. Our success stems from the creativity, commitment and enthusiasm of our highly qualified team.

With our locations in Germany, the US, Brazil, China and Thailand we support our customers at any time – worldwide, with fascination for innovation.

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