



# Line Scan Vision Platform



## 1. Introduction

The selection of the optimal components for a line scan camera system is a complex task requiring extensive knowledge about cameras, optics, and lighting. With the **Line Scan Vision Platform** Chromasens simplifies the design of a complete line scan camera system and additionally offers the possibility to create an 'all in one solution' using standard products and predefined elements from a modular framework. This approach reduces the time for system design and provides an optimized and cost-efficient solution.

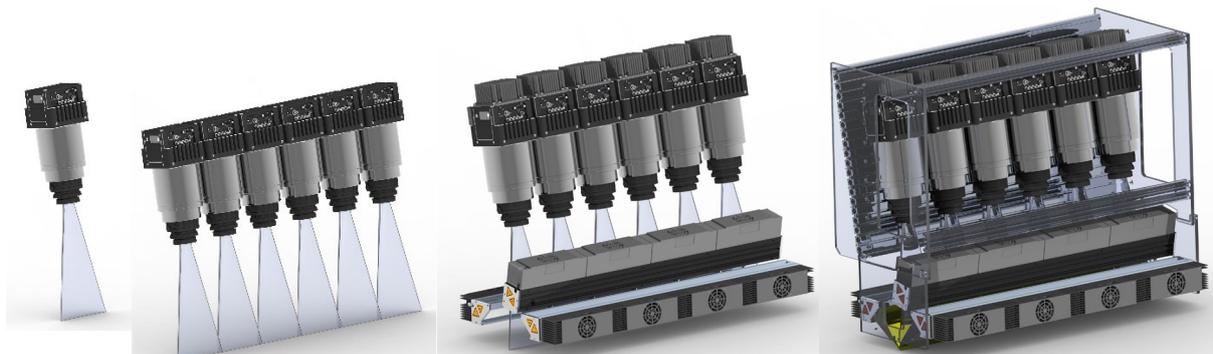
## 2. A complete inspection system: the Line Scan Vision Platform

Based on many years of experience in designing and building line scan camera systems, Chromasens has developed a modular platform that can greatly simplify the design and build up of a line scan camera system. This **Line Scan Vision Platform** contains all needed components to get a perfect solution in short time for a wide range of applications: a system concept with predefined modular components like line scan cameras, lenses, lens adapters, cables, camera alignment adapters, and a unique line light assembly kit covering any kind of light geometry and light colour. Feature rich cameras enable synchronization of any number of cameras as well as multi-field imaging.

The **Line Scan Vision Platform** currently contains all Chromasens line scan cameras with line lengths from 4K to 15K and line rates up to 100 kHz, and a wide range of lenses from different vendors to match all sensor lengths and required resolutions.

Included are all light types of the Chromasens Corona series, such as dark field, bright field, dome light, combined dome light, and co-axial illuminations. In particular, light combinations are also possible, e.g., to realize multi-field image capturing with different lighting conditions in a single system using the multi-flash function. Lights are available in white, red, green, blue, and also in UV, NIR and SWIR. The platform is optimized for, but not limited to, Chromasens cameras and light modules.

The mechanical design is based on a flexible modular system with predefined elements that is scalable and supports several cameras in a row for large scan widths and high-resolution applications. The length of the frame can be chosen as required - any length up to one meter is possible, see figure 1. Larger field of views can be achieved with customized solutions. The concept also allows the cameras to be mounted at an angle to the viewed surface. This option is used especially for the inspection of shiny surfaces, to eliminate reflections, and for combining several light characteristics.



*Figure 1: Building up a complete system using the line scan vision platform: from camera with lens to a system with multiple cameras with combined light and robust mechanical housing*

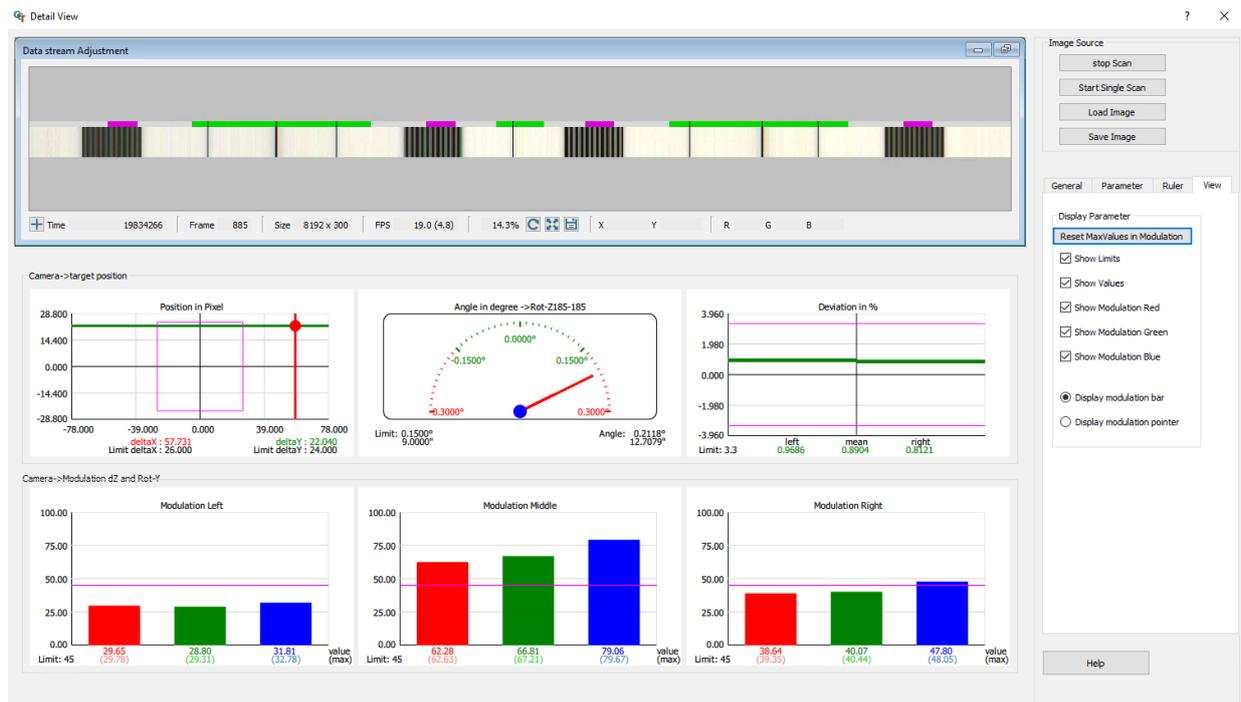


Figure 2: Camera alignment target and real time measurement of camera position, MTF and resolution.

To make the line scan vision system complete, all additional required components like cables, network adapters and light controllers are provided as well.

In addition to the hardware aspects, Chromasens offers the user-friendly GCT software for GenICam cameras, which allows easy configuration and calibration of the cameras. Graphical user interfaces are provided to quickly set up any kind of camera feature.

Many components and design steps are already prepared within this platform. In addition, Chromasens always encourages a close and intensive technical exchange during the entire planning phase. A close discussion about the status and intermediate steps is and remains an important basis and is an essential part for the optimal system selection.

### 3. Designing your vision system with the Line Scan Vision Platform

Application requirements, such as resolution, scan width, speed, etc., are entered into the unique Chromasens configuration software to select camera and lens. From these parameters appropriate components are determined and a suitable system proposal with cameras and all required optical components is created within this software. Several system proposals can be generated to find the best solution from different designs.

The output of the configurator is a sketch of the geometrical arrangement with distances and scanning widths and a list of cameras, lenses, and adapters – see figure 3.

With these components defined, the appropriate mechanical design is then selected. For the type of light, existing know-how can be used, or for many object surfaces hands on testing is recommended to determine the ideal light configuration.

The camera configurator contains all components of the **Line Scan Vision Platform** and takes into account, for example, the length and pixel size of the camera sensor as well as lens parameters such as image circle and scale range and other internal parameters when selecting components. It is possible to very quickly receive precisely matched system components that meet the requirements. For a better evaluation of the lens, the lens data sheet can be viewed directly in the configurator to get more details, e.g. the MTF diagram.

After selecting the system components, the next step is to perform tests and start the development of the image processing part. In this phase, with the **Line Scan Vision Platform** a robust system can be designed very quickly with the components determined from the camera configurator and the predefined mechanical modules.

Adapters are supplied for easy alignment of the cameras and the entire system. Using the special reference targets in combination with the alignment software the camera position can be measured in real time and interactively corrected. The software interface presents graphically all measures required like position, MTF and resolution as presented in figure 2.

Based on this system a prototype can be built up in a short time to provide a complete line scan system that can be tested both in the laboratory and in the machine.

Testing can be performed by the user of the system. But it is also possible to assign Chromasens for these tests.

Typically, Important insights are gained from testing, which can lead to changes or adjustments. A close exchange is also very important in this phase to work out the best possible solution based on the platform or decide for additional customized adaptations.

With the components selected for the prototype, a complete line scan camera system can be created directly using the existing components and modules of the **Line Scan Vision Platform**.

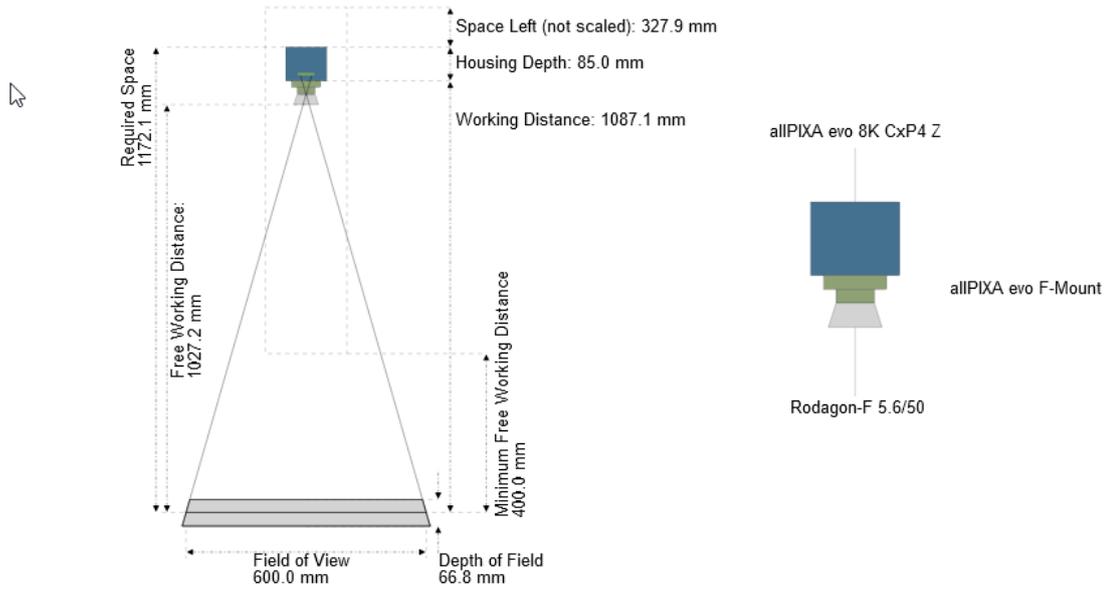
Depending on the customer's requirements and application, however, it may also make sense to make modifications to the existing modules, e.g. to further reduce costs or to take space restrictions into account.

The **Line Scan Vision Platform** enables integrated, turnkey vision solution with limited development effort and time. The platform closes the gap between the integration of a bare camera and a fully customized and integrated vision system.

#### 4. Perfect Vision Solution for all high-speed applications

The **Line Scan Vision Platform** has advantages for systems with one camera and especially in the combination of several line scan cameras in one system:

- Pre-assembled and pre-adjusted complete system with all components in one system – with almost no limitations in number of cameras
- Precision-aligned multi-camera options
- Defined mechanical fastening for easy and quick installation
- Choice of interfaces: Camera Link, 10 GigE, CoaXPress
- Versatile light configurations can be integrated right away.



View Single Camera    View Multi-Camera System    Autoselect Number Kameras    Number Cameras --    1    Number Cameras ++

<b>allPIXA evo 8K CxP4 Z</b>  <p>CP000620-S-08K-33-F1-C1-Z                  Maximum Linerate [kHz]: 100.0                  Data Interface: CxP                  Mount: M72                  Pixel Size [um]: 5.0                  Number of Pixels: 8192                  Spectral Range: RGB-Grey                  Dimensions (h w d) [mm]: 76.0 x 102.0 x 85.0</p>		<b>Rodagon-F 5.6/50</b>  <p>Focal Length [mm]: 50.2                  Image Circle [mm]: 46.0                  Optimized Magnification <math>\beta</math>: -0.1                  Magnification Range <math>\beta</math>: -0.5..0.0                  Mount: F-mount                  Spectral Range: VIS</p>	
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Figure 3: Design Example of the Camera Configurator Software with one camera

Due to its flexible and modular design, the platform can be used for a wide range of applications, including

- Print Inspection
- Inkjet Print Inspection
- Web Inspection
- PCB and Wafer Inspection
- Sorting
- Surface Inspection
- Document Scanning & Digitization
- Logistics
- Pharma

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