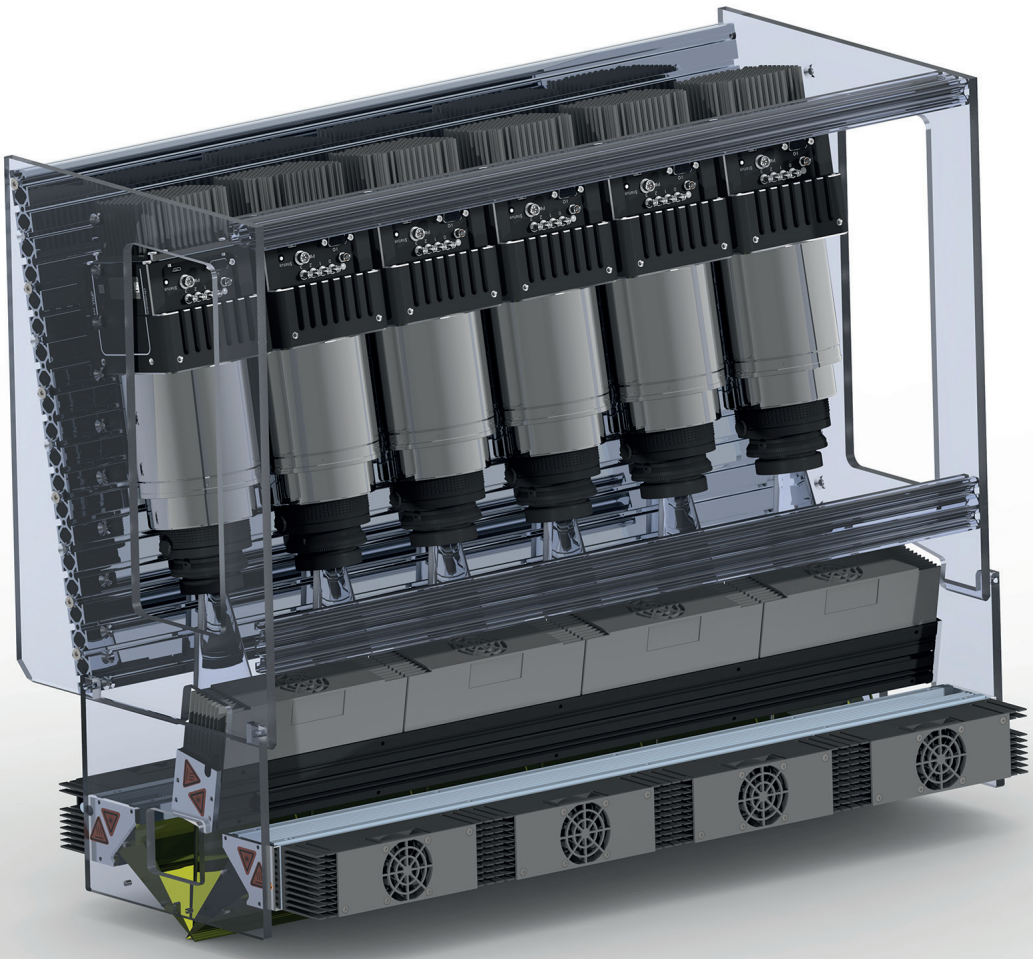
chromasens
IMAGING FOR PROFESSIONALS

LINE SCAN VISION PLATFORM

A MODULAR AND FULLY-SCALABLE VISION INSPECTION SOLUTION FOR ALL HIGH-SPEED APPLICATIONS

WHITEPAPER



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.

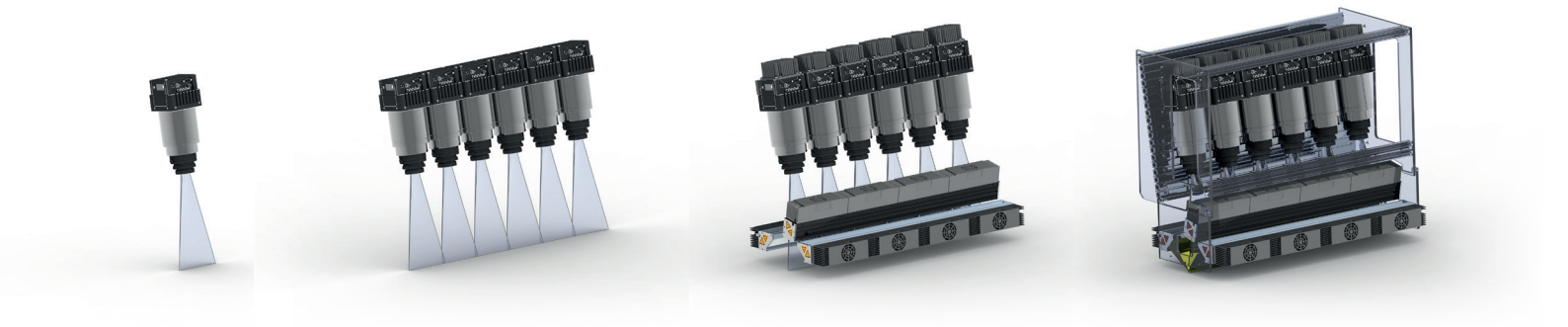


Figure 1: *Building up a complete system using the line scan vision platform: from camera with lens to a system with multiple cameras with combined light and robust mechanical housing.*

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 a short amount of 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 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).

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

Options of Chromasens Corona II light types include 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.

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.

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

Camera Configurator Tool

Application requirements, such as resolution, scan width, speed, etc., are entered into the unique Chromasens Camera 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.

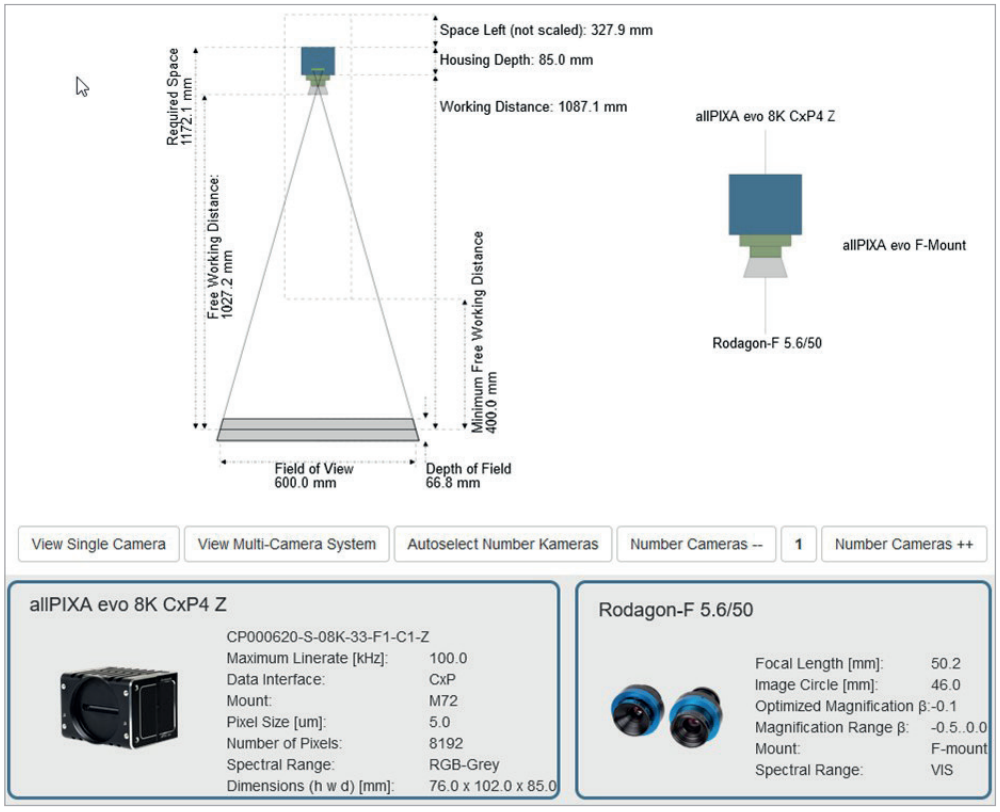


Figure 2: *Design Example of the Camera Configurator Software with one camera and lens*

The output of the Camera Configurator is a sketch of the geometrical arrangement with distances and scanning widths and a list of cameras, lenses, and adapters (see figure 2).

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 along other internal parameters when selecting components. It is possible to very quickly receive precisely matched system components that meet the requirements (see figure 2). 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.

Alignment Adapter

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 required measures like position, MTF and resolution as presented in figure 3.1.

Figure 3.1: *GEN<i>CAM supported GCT Software: Camera alignment target and real time measurement of camera position, MTF and resolution.*

GEN<i>CAM

Figure 3.2: *Alignment target*

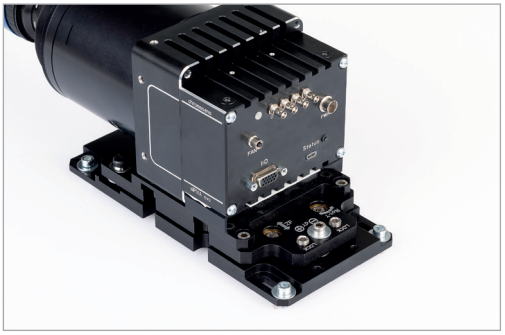


Figure 3.3: *Alignment adapter for easy and accurate adjustment with mounted allPIXA evo 15k CXP line scan camera.*

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

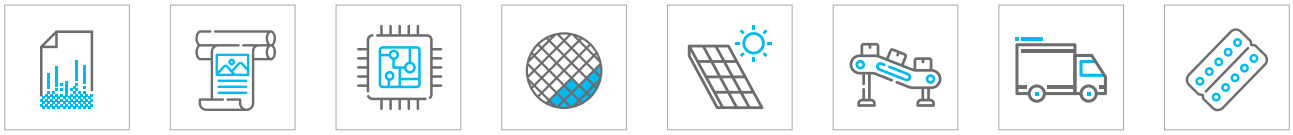
Testing can be performed by the user of the system, but it is also possible to assign Chromasens for these tests.

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

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 the application, 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 in systems with one camera model and especially when combining several of these line scan cameras of the same model 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: CoaXPress CXP-12 10 GigE Camera Link
- Versatile light configurations can be integrated right away
- Master-slave configuration – one camera manages all communications for all cameras simplifying programming and synchronization.

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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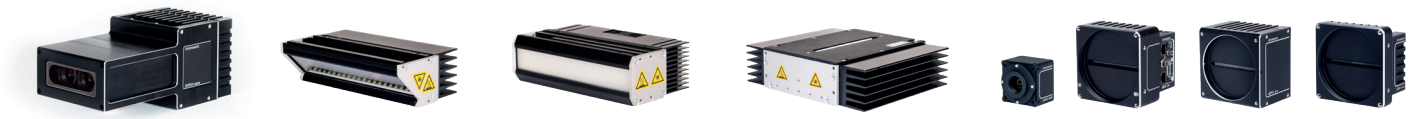

THE LINE SCAN EXPERTS

LINE SCAN CAMERAS

LED LINE SCAN LIGHTING

3D LINE SCAN CAMERAS

CUSTOMIZED OEM SOLUTIONS

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