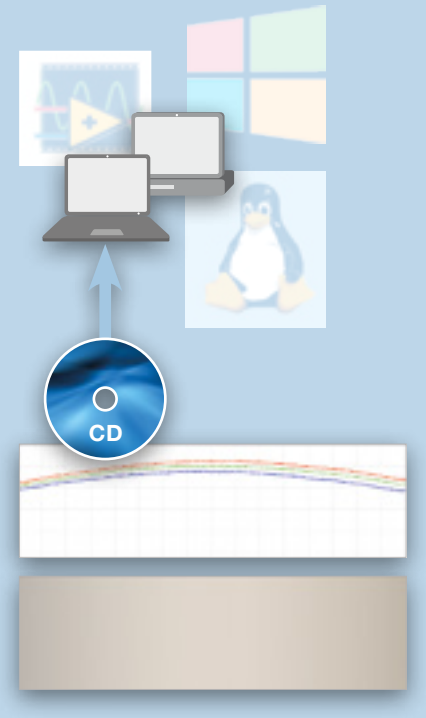
Software

Software for Line Scan Camera Systems

Software for Line Scan Cameras



Software for Line Scan Cameras

SkLineScan program and Software Development Kit (SDK)

- The software is available for line scan cameras with GigE or USB 3.0 interface
- Operating program SkLineScan for setup and simple scanning tasks
- SDK with API and class library for development of customized application software
- Examples in C/C++ can be used as templates to developing own programs
- VI Library for LabVIEW
- Supported operating systems are Windows 7, 8.1, 10, and Linux kernel 3.13+, 32-bit and 64-bit

```
int CCameraInit::Camera(int CamID, DWORD IPaddr, DWORD Subnet)
{
    if (SK_GETDEVICES() < CamID + 1)
        return SK_RESULT_DEVICE_ERROR;
    if (IPaddr != 0)
    {
        // set IP address
        if (SK_SETIPADDRESS(CamID, IPaddr, Subnet)
            != SK_RESULT_OK)
            return SK_RESULT_NETWORK_ERROR;
    }
    int result = 1;
    result = SK_INITCAMERA(CamID);
    if (result != SK_RESULT_OK)
        return SK_RESULT_DEVICE_ERROR;
}
```

SkLineScan program

The Schäfter+Kirchhoff SkLineScan program is designed for the start-up and control of their line scan cameras. All functions of the connected cameras can be checked.

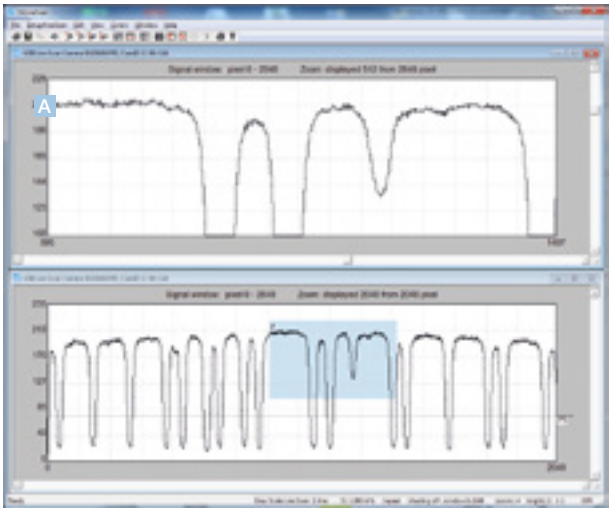
The user can adjust the total optical system of camera, lens and illumination by using the real-time display of the line signal A .

The operating parameters of the camera can be changed interactively during signal acquisition.

Each individual pixel of the line signal can be displayed by using the zoom or scroll functions and signal images can be saved.

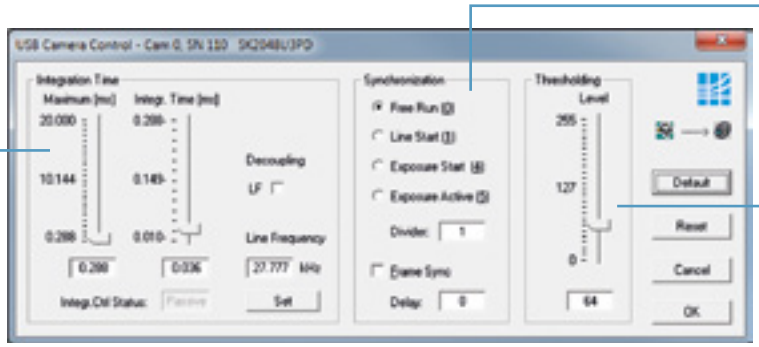
The program also enables the two-dimensional area scanning of surfaces to be acquired using the line scan camera.

The SkLineScan program is free for downloading from the support area of the Schäfter + Kirchhoff homepage.



Control of the camera integration time and setting of line frequency.

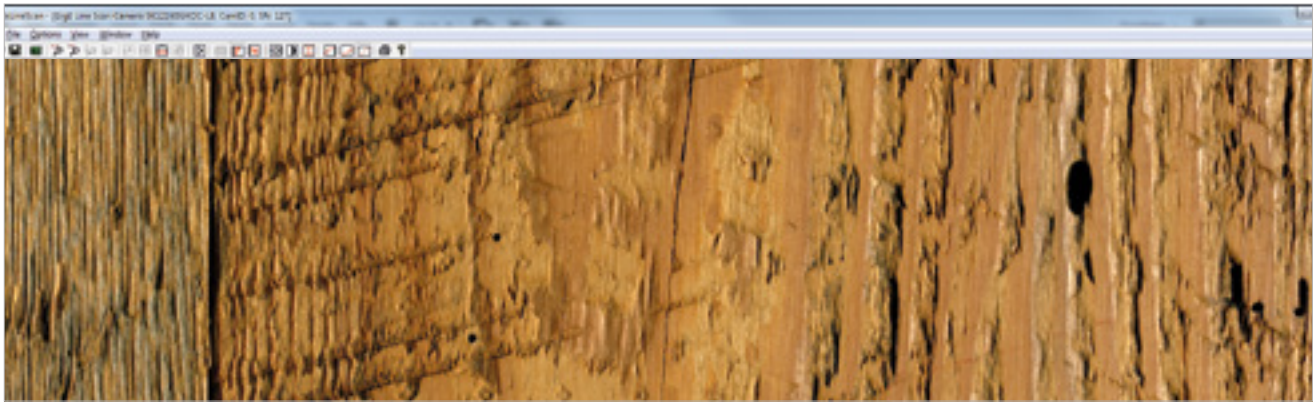
Decoupling of line frequency and integration time.



Selection of synchronization mode. Adjustment of the trigger clock divider.

Adjustment of the intensity level for binarization of the line signal in threshold operation mode.

A color area scan using the SkLineScan program



Software for Line Scan Cameras

:	New line scan signal. All other open signal windows will be closed. ([F2])
:	Save brightness profile of a single line scan, or the image of a 2D scan
:	Open / Close the parameter dialog. ([F4])
:	Zoom IN, x-axis.
:	Zoom OUT, x-axis
:	Zoom IN, y-axis.
:	Zoom OUT, y-axis
:	Opens an additional line scan window. Keeps open line scan windows. ([F2])
:	The camera works in Threshold Mode
:	Opens the dialog for Shading-Correction (white balance). ([Alt] + [S])
:	Lookup table programming
:	Programming of signal window (ROI). ([Alt] + [W])
:	Dialog for Gain / Offset control, and input serial commands. ([Shift] + [F4])
:	Starts an area scan. ([F3])
:	Repetitive grabbing
:	Snap an image
:	Increase the pixel intensity for more brightness of area scan (x 2) – displayed in status bar.
:	Reduce the pixel intensity for lower brightness of area scan (/ 2).
:	Print
:	About dialog

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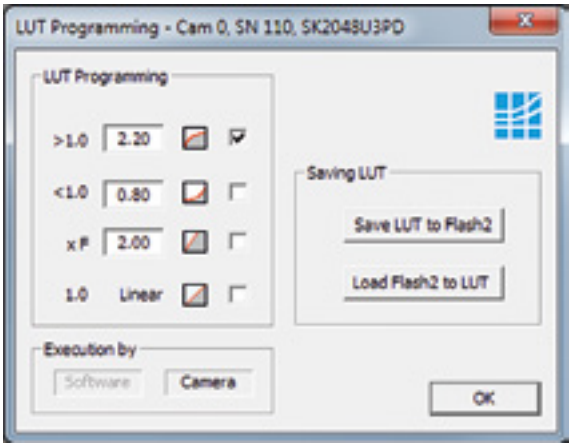
All of the settings adjusted using the SkLineScan program are saved inside the camera when the program is closed. The adjustments for shading correction, lookup table, gain, offset, integration time, etc can be performed using the SkLineScan program and are available when the camera is controlled by a customized application. Previously stored parameters are used on start-up and these parameters can be changed during the running of an application. This is suitable for example to program a LUT or a Shading Correction profile in the camera.



The Lookup Table (LUT) is a form of pre-processing inside the camera. By programming a transformation function, brightness values of the camera can be converted to their corrected values. The transformation of image data can be useful in obtaining better imaging results, e.g. providing more contrast or higher dynamic range.

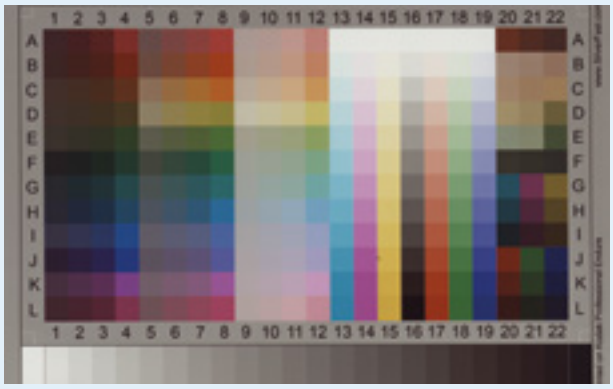
The SkLineScan program supports Gamma Correction (convex: gamma > 1.0, concave: gamma < 1.0), and Linear Function with a factor. The Linear LUT with factor 1.0 provides the unaltered image data.

The desired transformation function can be activated by inputting the appropriate parameter and clicking on the icon or tick box.

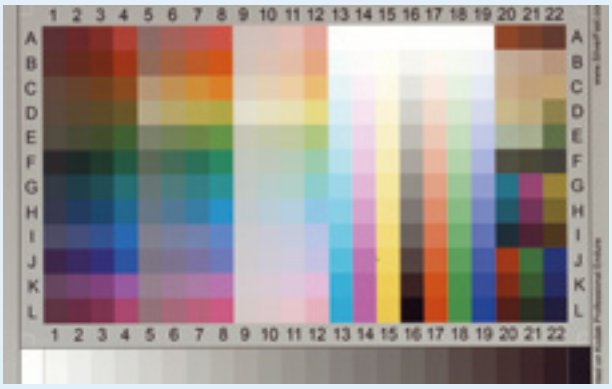
If the camera does not support LUT programming, the transformation can be performed by using downstream software.

To permanently save the current LUT in the camera, press the button “Save LUT to Flash2”.

Application: Gamma correction for color images

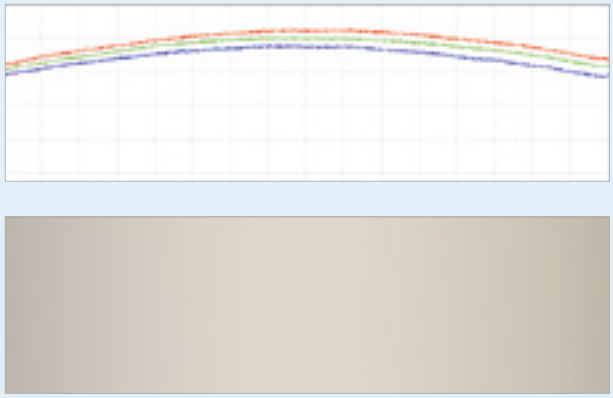


A color image of an it8-target without correction, dark colors are difficult to differentiate

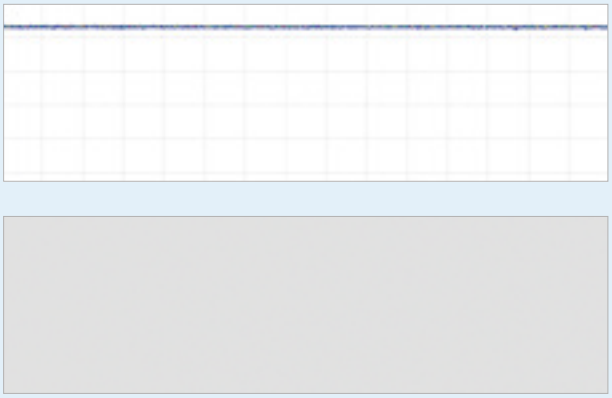


Using the Gamma Correction 2.2, dark colors are brighter and can be differentiated better

Application: Shading Correction and White Balance



RGB raw signal and area scan without white balance



Line signal and area scan with active white balance

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Software Development Kit (SDK)

Schäfter+Kirchhoff offers an SDK with API DLLs and C++ class libraries for GigE and USB 3.0 cameras for the development of customized application software.

The SDK package also contains some examples in C/C++ as a template for the development of personally customized applications.

Source code comments and a manual complete the camera programming environment.

The SDK package consists of two parts:

1. Core

The core is needed to drive the line scan camera and consists of the device driver and the base DLLs. The core can be provided together with the application software to the end customer by the developer. By using the core, developers are able to build a slim installation package for their software.

2. Application Programming Interface (API)

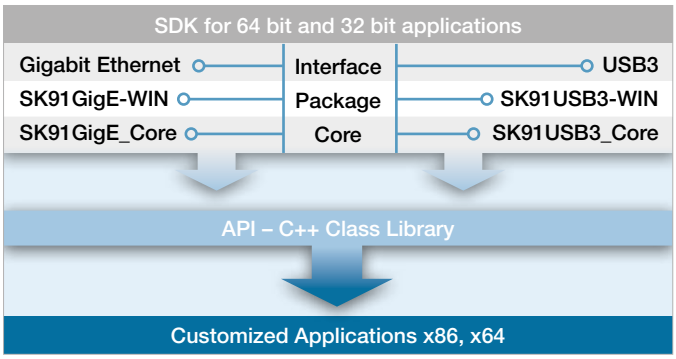
The API contains a class library for C++ as well as some compilable projects including the source code as examples. The supported developing environment is the Microsoft Visual Studio 2012, 2015, and 2017.

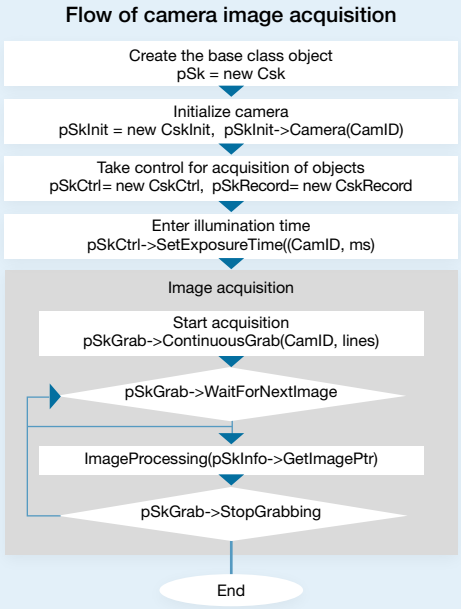
Supported operating systems are Windows® 7 / 8.1 / 10, and Linux®. A VI-library for software development using LabView® is available too.

For programming a line scan camera with a Camera Link® interface, the software development kit (SDK) supplied by the manufacturer of the grabber board must be used.

Csk	**– Base class**
struct sk_interface	Communication structure for the driver
CskInit: Csk	**– Initializing class**
::Camera	Initializing the camera
::AllocBuffer	Allocate memory in the user area
::FreeBuffer	Release memory
::SetUserBufferPtr	Set pointer to user buffer
CskCtrl: Csk	**– Control class**
::SetIntegrationTime	Set integration time (ms)
::SetLineFrequency	Set line frequency (kHz)
::SetSyncMode	Set synchronization mode
::SetGain	Set camera gain
::SetOffset	Set camera offset
CskRecord: Csk	**– Acquisition class**
::SingleLineScan	Get a single line scan
::AreaScan	Acquire a 2D scan
::ContinuousGrab	Start continuous grab
::GetImage	Get single image from a continuous grab
::StopContinuousGrab	Stop continuous grab
CskView: Csk	**– View class**
::LineScanView	Display a line scan signal
::AreaScanView	Display an area scan
CskInfo: Csk	**– class**
::GetCamType	Name of current camera
::GetPixWidth	Number of current camera pixels
::GetLineFrequency	Current line frequency in kHz
::GetUserBufferPtr	Pointer to data set in user memory

* Examples from the class library containing more than 60 ways to control a GigE line scan camera





Software products

SkLineScan Operating Program			
Product	Interface	Operating System	Price
SkLineScan-GigE-WIN_x64_x86	GigE, GigE Vision*)	Windows 7/8.1/10	https://www.sukhamburg.com/supporte.html
SkLineScan-U3-WIN_x64_x86	USB 3.0	Windows 7/8.1/10	https://www.sukhamburg.com/supporte.html
SkLineScan-U3-LX_x64_x86	USB 3.0	Linux®	https://www.sukhamburg.com/supporte.html
Software Delelopment Kit (SDK)			
SK91GigE-WIN	GigE, GigE Vision*)	Windows 7/8.1/10	on request
SK91USB3-WIN	USB 3.0	Windows 7/8.1/10	on request
SK91USB3-LX	USB 3.0	Linux®	on request
SK91USB3-LV	USB 3.0	LabVIEW	on request

*) SkLineScan and SK91GigE-WIN support only GigE Vision line scan cameras from Schäfter+Kirchhoff.
Other GigE Vision compliant software is fully compatible with the Schäfter+Kirchhoff GigE Vision line scan cameras.