

## Motorized Lens Control for Prosilica GE4000 and GE4900

page 1

## GigE Vision Rock Solid in Harsh Mining Environments

page 2

## GE680: 200 frames per second, VGA Resolution

page 6



## Motorized Lens Control for Prosilica GE4000 and GE4900

Prosilica's 35mm format GigE cameras, the 11 megapixel GE4000 and the 16 Megapixel GE4900, are normally configured to accept F-mount lenses, but using a Birger adaptor can accept Canon EF lenses.

The Birger adaptor is a device that allows a wide range of off-the-shelf Canon EF lenses to be mounted on the GE4000 and GE4900 bringing the added benefit of motorized lens control for functions such as iris and focus control to large format industrial cameras. The lens control functions are facilitated by connecting the Birger adaptor to the RS-232 peripheral port of the camera and can be programmatically operated via the Prosilica SDK. This functionality is particularly suitable for remotely controlled applications such as specialized traffic or security control.

The GE4000 and GE4900 cameras can be ordered with the Birger adaptor already integrated into the camera.

**For further information, please contact [sales@prosilica.com](mailto:sales@prosilica.com)**

### » Camera Links

#### Prosilica GE4900

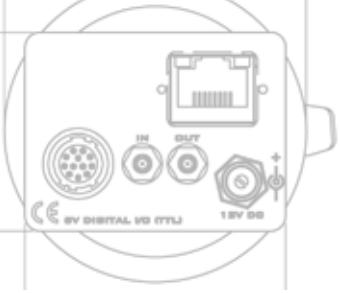
<http://www.prosilica.com/products/ge4900.html>

#### Prosilica GE4000

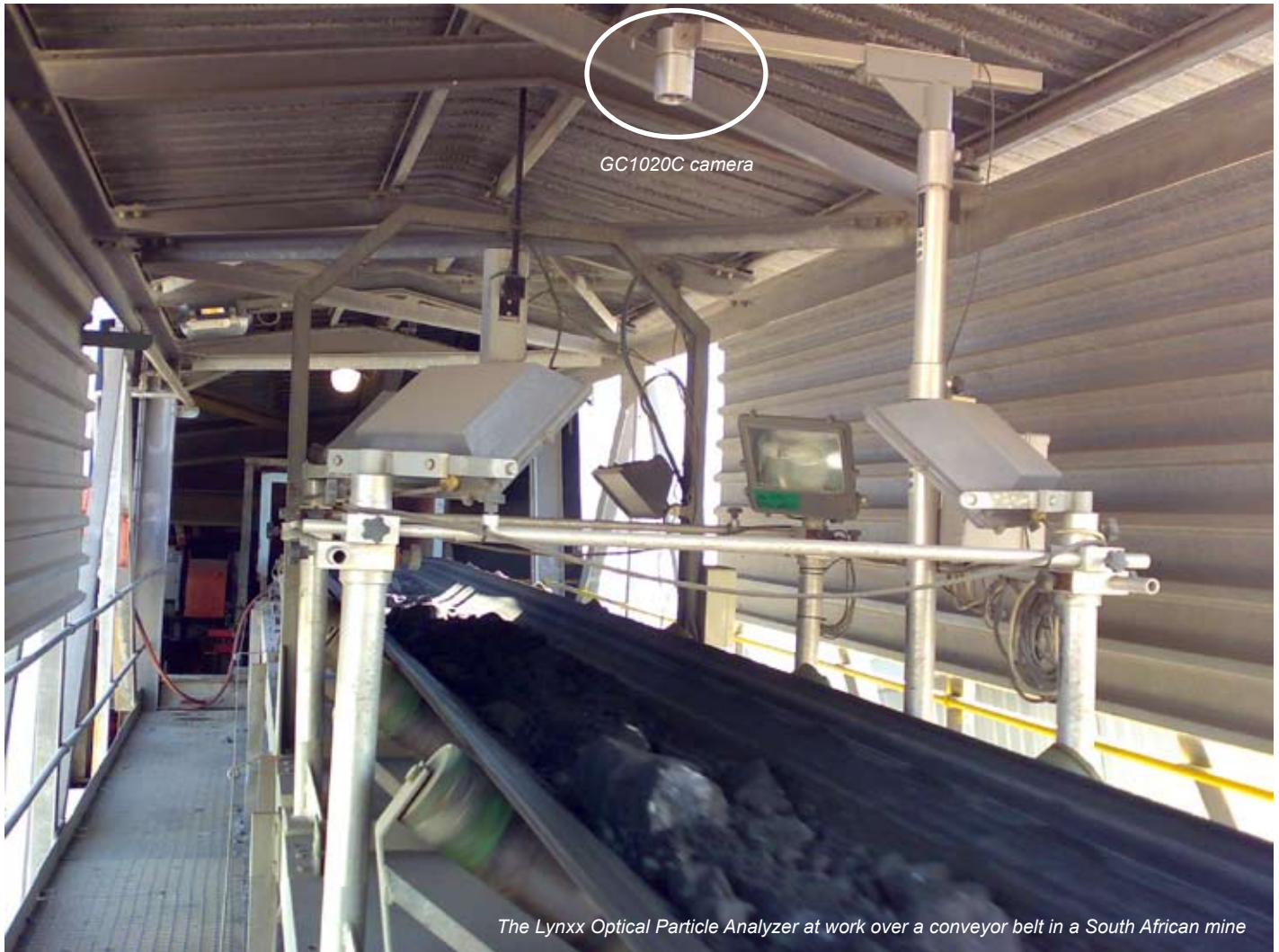
<http://www.prosilica.com/products/ge4000.html>



*GE4000 camera with Birger Adaptor (top) - 16 Megapixel GE4900 camera with Birger adaptor and Canon lens (bottom)*



## GigE Vision Rock Solid in Harsh Mining Environments



GC1020C camera

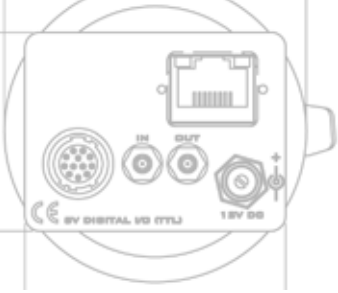
The Lynxx Optical Particle Analyzer at work over a conveyor belt in a South African mine

### Prosilica GC1020C used in Ore-sizing system

South Africa boasts an abundance of mineral resources and is a leading producer of precious metals such as gold and platinum. The mining industry is the country's largest employer with around 900,000 people working in the industry and related services.

Based near Cape Town, South Africa, Stone Three Venture Technology (Pty) Ltd is an advanced product development house that designs turnkey systems for a variety of sectors in numerous industries including the mining and agricultural industries. In 2003, Stone Three partnered with Anglo Platinum Research<sup>1</sup> to develop the *Lynxx Optical Particle Analyzer*, a device that measures

the size distribution of ore<sup>2</sup> on conveyor belts in a mining environment. The ore is primarily measured for two reasons: 1. to maximize its economic value as it is later sold on by the mining company for processing and 2. to optimize the comminution<sup>3</sup> process in certain industries such as the Platinum and Chrome industries .



GC1020C camera inside Stone Three's IP68 compliant custom-made cylindrical camera enclosure

## Machine vision brings higher productivity

Once mined, the ore goes through the comminution process (i.e. crushing and grinding) to be reduced to smaller particles. The particle size varies depending on the comminution technique used or on the metal mined. Traditionally, the size of ore particles is measured using the belt-cut technique where the conveyor belt carrying the particles is stopped so that samples can be manually analyzed. Thanks to its machine-vision based technology the *Lynxx Optical Particle Analyzer*, using the Prosilica cameras, provides a real-time and more productive alternative to the belt-cut technique. The system is capable of measuring ore

particles ranging from 10mm to 750mm (0.4 – 29.5") in size and can also detect faults such as oversized particles.

## Performing in a harsh environment

The *Lynxx* system is designed to be robust in order to operate seamlessly in a harsh mining environment where large amount of dust, and temperatures reaching up to 50°C (122°F), are common. *Lynxx* can cover a wide range of conveyor belt structures and sizes, ore appearances and size composition and is suitable for both open-pit or underground mines. It consists of two basic components: a sensory rig and a server unit.

## Sensory Rig

A steel support structure is assembled into a box-like frame and bolted on to an existing conveyor belt carrying the ore from the mine. The structure is fitted with four mini metal-halide floodlights positioned on each of the structure's support bars to provide sufficient light for the image capturing process.

The camera used in the *Lynxx Optical Particle Analyzer* system is the ultra-compact Prosilica GC1020C. The GC1020C is an XGA resolution (1024x768) color camera that features a Gigabit Ethernet interface. The CCD sensor provides fast frame rates (up to 30 frames per second at full resolution)

<sup>1</sup> Part of the Anglo Platinum Group. The Anglo Platinum Group is the world's leading primary producer of platinum and accounts for about 40% of newly mined production globally. (source: <http://www.angloplatinum.com>)

<sup>2</sup> An ore is a type of rock that contains minerals such as gemstones or metals that can be extracted through mining and refined for use.

<sup>3</sup> Comminution: the process of reducing particle sizes of rocks and ores.

# Case Study

and excellent image quality. The camera was selected for its ultra-compact size, reliability and ruggedness.

The GC1020C camera is equipped with either the manual iris and varifocal Tamron 3.0-8mm F/1.0 or 5-50mm F/1.4 lens depending on the installation requirements. The camera is fitted inside Stone Three's custom-designed water-proof and dust-proof IP68 industrial enclosure. The cylindrical enclosure is made of anodized aluminium on the outside to avoid corrosion and is

designed to conduct heat away from the camera. The camera is bolted to the top of the steel structure (between 50cm and 1.5m – 19 to 59”) above the conveyor belt and looking down.

The system images continuously capturing between 15 to 25 frames per second as the ore travels on the conveyor belt. Camera settings such as auto-exposure and gain are set programmatically depending on the conditions.

## Server unit

The Windows-run server is located in an environmentally controlled room and receives the image data directly via fiber optic link and is connected to the plant's network.

The *Lynxx* proprietary software receives live images from the conveyor belt installation and performs various operations, such as component detection and segmentation, before calculating the ore-size distribution. The software also provides additional functionalities



# Case Study

including post-processing, data logging and outputting, and image storage. The Lynxx software was developed using C++.

The system also offers an optional remote viewing software that displays the video feed, historical data as well as a histogram of particle sizes of up to two systems at a time.

Lynxx performances were evaluated and calibrated against real world data before its implementation.

The Lynxx Optical Particle Analyzer currently operates in several platinum mines in South Africa as well as iron ore and coal mines.

**Note:** Stone Three's custom-designed IP68 compliant camera enclosure is available for purchase. For further information, please contact: [info@stonethree.com](mailto:info@stonethree.com)

» **For further information**

## Prosilica GC1020C

<http://www.prosilica.com/products/gc1020.html>

## Stone Three Venture Technology (pty) Ltd

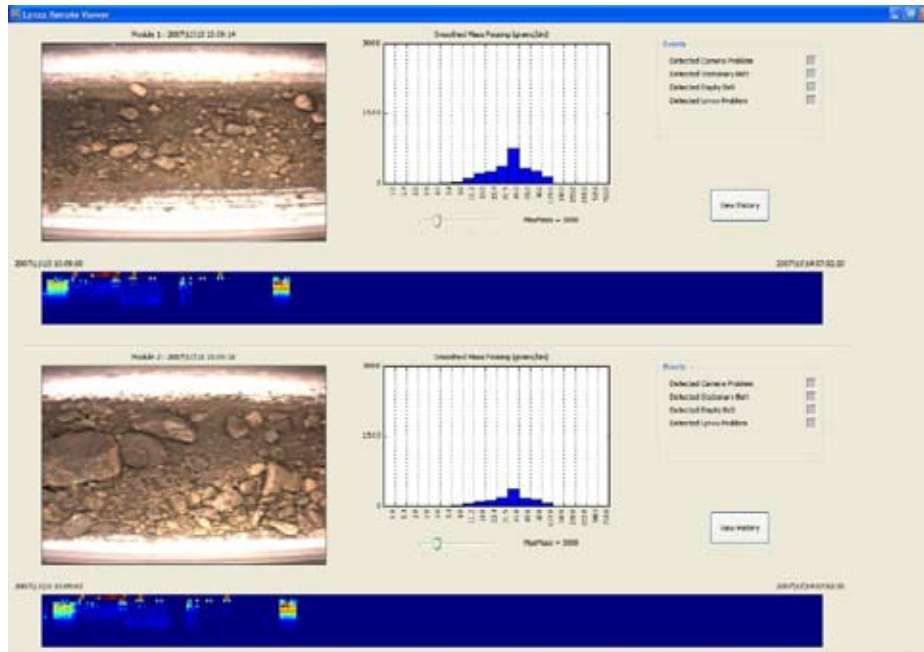
<http://www.stonethree.com/>

## Anglo Platinum

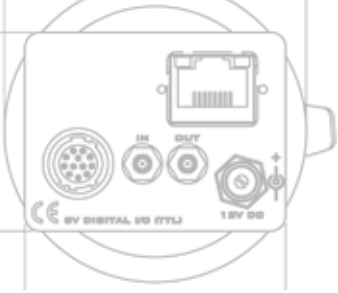
<http://www.angloplatinum.com/>

## Tamron

<http://www.tamron.com/>



Screenshot of the Lynxx Remote Viewer Software showing the video feed as well as histograms of particle sizes.



## GE680: 200 frames per second, VGA Resolution

The Prosilica GE680 is part of the GE-Series range of high performance machine vision cameras with Gigabit Ethernet interface (GigE Vision™).

### Fast frame rates

The GE680 runs 200 frames per second at full VGA resolution (680x480) and even faster using Area of Interest Readout (AOI). This compact camera features the 1/3" Kodak KAI-0340D CCD sensor that offers high speed and good sensitivity.

The GE680 is ideal for a wide range of applications including high-speed inspection, machine vision, optical character recognition, traffic imaging, robotics, OEM applications and much more.

The GE680 features a GigE Vision compliant interface that works with standard gigabit ethernet hardware and cable lengths up to 100 meters (300ft) using Cat-5e cable and up to several kilometers using fiber optics cables.

### Advanced features

The GE680 incorporates an advanced set of camera features including snapshot/global shutter, pixel binning, area of interest readout, external trigger and sync I/O, RS-232 peripheral port, exposure and gain controls, non-volatile configuration memory, event recorder capability, pre-

trigger recording, programmable strobe functions, multicasting, configurable IP addresses, autoexposure, autogain and autowhite balance controls.

The GE680 is available in monochrome and color (GE680C) models.

### About the GE-Series

The GE-Series are a range of high performance machine vision cameras that feature a wide variety of high quality and versatile models ranging from VGA to 16 megapixel resolution.

» **For further information:**

### GE680 / GE680C:

<http://www.prosilica.com/products/ge680.html>

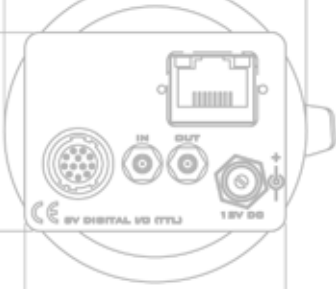
### GE-Series

[http://www.prosilica.com/products/ge\\_series.html](http://www.prosilica.com/products/ge_series.html)

### GE680 Features

- Very fast frame rate - 200 fps at 640x480
- 1/3" CCD sensor with 7.4 um square pixels
- GigE Vision compliant
- Asynchronous external trigger and sync I/O
- Region of Interest readout (AOI partial scan)
- Advanced binning modes
- Global shutter (Snapshot shutter)
- 32 MB resend buffer
- Screw-captivated power connection
- Windows, Linux, QNX SDK





## GE-Series Increase Input Voltage Range

The Prosilica GE-Series now offer an input voltage range of 5 VDC to 24 VDC (previously 5-17 VDC) making them compatible with an even wider range of industrial equipment.

Please note that this feature is not currently available on the GE4000 and GE4900 models.



### Published by:

#### Prosilica Inc.

101 - 3750 North Fraser Way  
 Burnaby, BC  
 V5J 5E9  
 Canada

Tel: +1 604.875.8855  
 Fax: +1 604.875.8856

Editor: Laurette Perrard

sales@prosilica.com  
 support@prosilica.com

[www.prosilica.com](http://www.prosilica.com)



# high resolution

**GE4900: 16 Megapixel Camera**

**GE4000: 11 Megapixel Camera**

Our cameras are designed and manufactured in-house to deliver a more robust and integrated product that meets the highest quality standards. Our products are noted for their high performance, ultra-compact size, light weight, fast frame rates, wide range of resolution, advanced triggering, sophisticated controls, industrial ruggedness, rich set of camera features and extreme versatility.

**PROSILICA**

**[www.prosilica.com](http://www.prosilica.com)**