



## CARBON FIBER COMPOSITES INSPECTIONS WITH POLKA

### Fraunhofer Institute for Integrated Circuits IIS

Executive Director  
Prof. Dr.-Ing. Albert Heuberger

Am Wolfsmantel 33  
91058 Erlangen, Germany  
Phone +49 9131 776-0  
Fax +49 9131 776-999  
info@iis.fraunhofer.de

Contact:  
Department Electronic Imaging  
Arne Nowak  
Phone +49 9131 776-5150  
Fax +49 9131 776-5108  
arne.nowak@iis.fraunhofer.de

[www.iis.fraunhofer.de](http://www.iis.fraunhofer.de)

### SAFELY DESIGNED AND INSPECTED WITH POLKA

To avoid safety risks, efficient and error-free quality assurance processes are essential in the production of parts made from carbon fiber reinforced polymers (CFRP). Because these components exhibit particularly high tensile strength only in the direction of the fibers, manufacturers must pay close attention to the direction in which the various plies are formed together during the production process.

### CFRP competence based on POLKA

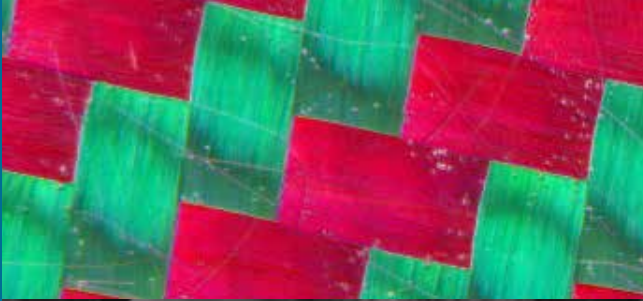
- Our polarization camera captures the orientation and position of the carbon fiber bundle in real time. Therefore, the ready-made component

exhibits the requested material properties for the respective application.

- The camera can easily be integrated into existing systems using a software API.
- Our camera supplies reliable results even in out-of-focus areas, thus simplifying the inspection of three-dimensional components.
- Analyzing the fiber direction even through transparent resin makes it possible to control how resin-dipped fiber mats are draped.
- POLKA leads to lower operational costs, reject rates and better machine performance.

### Take advantage of the lightweight properties of CFRP and let POLKA work for you!

One of the unique properties of carbon fibers is that they polarize incidental unpolarized



light parallel to the direction of the fiber.

Our camera exploits this effect to determine which way the fiber runs.

This is the only way to ensure the required stability of the component.

The method has been patented by the Fraunhofer-Gesellschaft in Germany and the United States.

Electrical

- GigE Vision or USB3 Vision interface
- Control signals: Sync, Trigger, Strobe
- Power supply: 5 volts, 3,5 watts

Mechanical

- Lens adapter: standard C-Mount
- Size: 55 x 55 x 65 mm
- Weight: 290 g

### POLKA at a glance

- Robust, industrial-scale camera system
- Single-shot images of the polarization information make it possible to record moving objects
- Intuitive operation
- Software API for immediately analyzing live images, documenting the fiber plies and saving the images for quality control purposes
- C-mount lens adapter
- Compatible with standard industrial image processing equipment

### POLKA – open to your application

Do you have a concrete application for POLKA that requires other interfaces or application-specific software?

We can modify the hardware design in accordance with your needs and enhance the software with proprietary image processing and analysis algorithms.

Are you interested in renting the POLKA system for test purposes over a specific period of time?

We would be happy to provide you with a quote.

### Technical data of our current prototype

Optical

- Resolution: 640 x 480 pixels
- Frame rate: up to 25 fps
- Sensor format: 3.8 x 2.9 mm
- Pixel size: 6  $\mu$ m

**Call today and discover the benefits of POLKA for yourself!**

*CFRP material (1) and CFRP tape with defects (2):  
The fiber direction is represented in pseudo colors  
(upper part of the image). The lower part of the  
image shows a conventional intensity image for  
comparison purposes.*

For more information, please visit:

[www.iis.fraunhofer.de/polka](http://www.iis.fraunhofer.de/polka)