



# **HIGHSPEED** CAMERA SYSTEMS

*Track processes?  
It's quick and easy!*



**IPF ELECTRONIC**

**High-End** in High-Tech.



**SCAN QR CODE AND READ  
FLYERS IN DIGITAL FORM**

## **HIGH-SPEED CAMERA SYSTEMS FOR PROCESS TRACKING**

### **SIMPLE ANALYSIS OF FAST INDUSTRIAL PROCESSES**

In many areas of industry that employ short cycle times, fast-running processes ensure reduced processing times and, thus, a high productivity. But what happens if an error or malfunction creeps into an application, the cause of which cannot be determined or simply cannot be reproduced due to the high process speed?

Production comes to a standstill, costs rise and – in the worst case – the result is complete scrap. Moreover, time is pressing, as the cause of the error must be determined as quickly as possible, especially if downstream production processes could be affected by the problem.

Another challenge is optimizing fast-running processes in a sustainable manner to increase production output and thereby gain the decisive boost in productivity. This is no easy task if the details of a production sequence on a system cannot be followed with the naked eye and over a predefined time period.

### **SOLVE PROBLEMS SYSTEMATICALLY, INCREASE POTENTIAL SUSTAINABLY!**

With the high-speed camera systems of the **OC29** series (monochrome or color) from ipf electronic, you can track fast-running processes and thereby quickly determine the cause of possible error sources with little effort through a simple, targeted analysis. Or your productivity is simply increased by now truly identifying the decisive potentials in fast-running processes. The camera systems can communicate with common controls. This puts you in the position to automate process observation and then isolate faults using PLC controls or identify other optimization possibilities in a more targeted manner.

Scan the QR code and learn about the performance capability of the systems from ipf electronic!



## **COMPACT, SIMPLE, FAST, EFFICIENT**

**REDUCE STANDSTILLS, INCREASE PRODUCTIVITY**

### **INTUITIVE FOR THE OPERATOR**

Make it easy for yourself! The **OC29** series from ipf electronic consists of extremely compact industrial cameras which can be mounted nearly anywhere and can be used for process analysis. Thanks to the specially developed, user-friendly and – moreover – cost-free software, the systems can be used immediately without extensive training. Images are transferred to a PC or laptop directly via USB 3.0. The recordings can then be processed immediately. All basic functions necessary for a targeted process analysis are directly available via the intuitive user interface. If necessary, additional functions can be displayed and used.

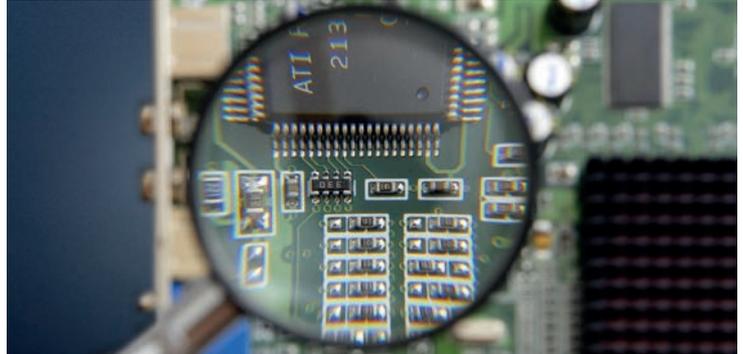
### **AUTOMATE INSTEAD OF INVESTING TIME**

The systems of the **OC29** series can communicate with the current controls from Beckhoff, Siemens and B&R to start or stop a recording or to transmit signal states of a control in the recording via Ethernet or digital I/Os. The corresponding address of the control is selected in the basic settings. With up to three trigger variables, recording can be started, stopped and if recording to a circular buffer – switched to stand-by. Signal recording can be used to record up to three signals of data types bool, integer or double and to integrate them in the video image.



## TARGETED ANALYSIS

Are your processes too fast to recognize malfunctions? The **OC29** record fast-running processes and help to easily and systematically identify the causes.



## VALUABLE TIME SAVINGS

Does your system produce NOK parts, thereby slowing down production processes? The **OC29** support you here in quickly rectifying errors, allowing you to put your systems back into operation in the shortest time.



## SUSTAINABLE OPTIMIZATION

Is your productivity dropping because processes are not running optimally? The **OC29** offer you the possibility to better identify potentials for process optimizations to increase output in a sustainable way.



## NOTICEABLE COST REDUCTION

Are your systems frequently at a standstill due to faulty processes? The **OC29** ensure high system availability through shorter standstill times and, thus, an optimum utilization rate while simultaneously reducing costs.



# **ONE SYSTEMS WITH CONVINCING CHARACTERISTICS**

**VISIBLE RESULTS IN A VERY SHORT TIME**

## **HIGHLIGHTS**

- /** Fast availability: easy installation and plug&play connections
- /** Easy to get started: user-friendly software with intuitive user interface
- /** Significant time savings: optimized process analysis with little training effort
- /** Clear cost savings: low hardware costs (standard PC or laptop, camera with C-mount lens thread, free software), simple and fast process analysis
- /** Intelligent additional functions: Sensor- or PLC-controlled recording behavior

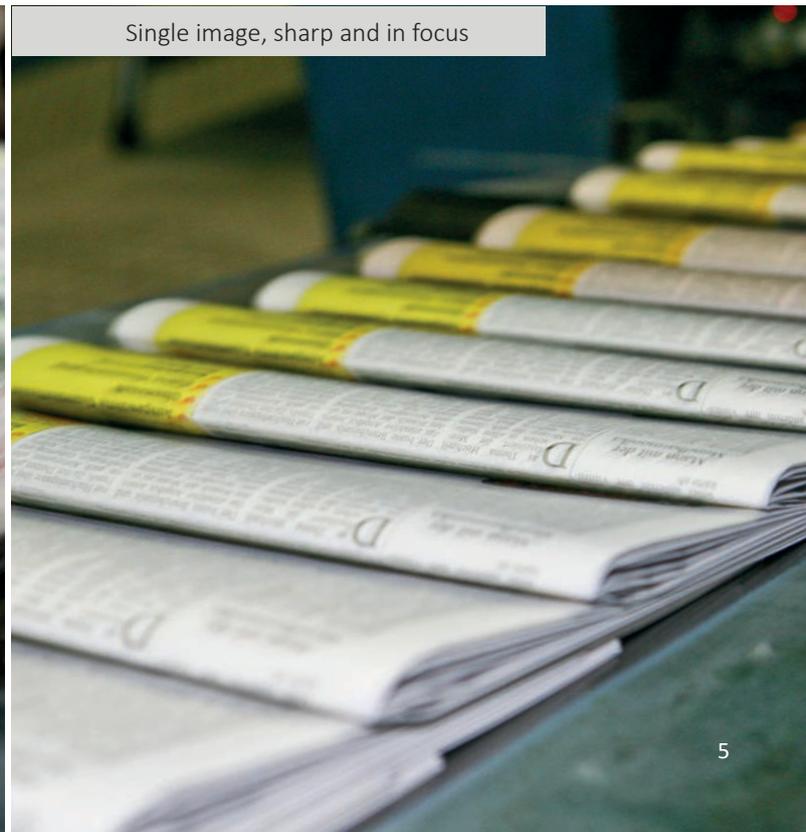
## **ADVANTAGES**

- /** Observe and analyze processes in a targeted manner
- /** Easily identify faults with little effort
- /** Reduce system standstills to a minimum
- /** Noticeably reduce scrap or avoid it completely
- /** Effectively increase productivity
- /** Sustainably optimize cycle time
- /** Efficiently minimize set-up times

Motion blur



Single image, sharp and in focus



# RECORDING FUNCTIONS

READY FOR USE IN JUST A FEW STEPS

Through the easy-to-use software interface with its clearly arranged switching elements, the **OC29** are immediately ready to use in just a few steps. For recording, select between "recording time" and "circular buffer".

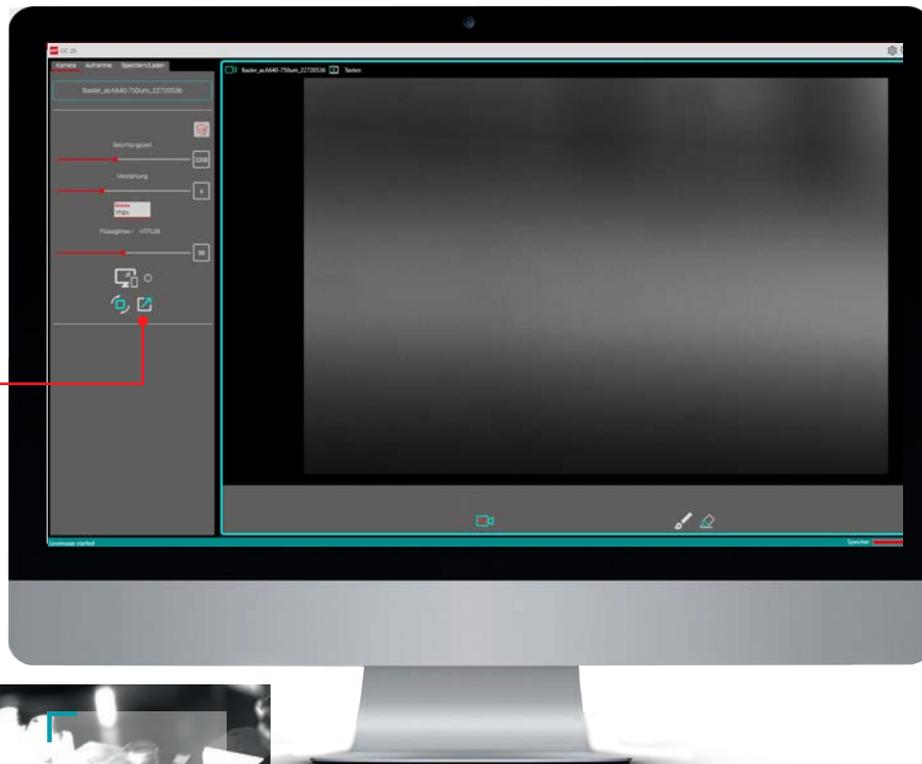
The **OC29** offer two recording modes.

**Recording time:** Once started, the camera records for the previously selected time.

**Circular buffer:** Recording occurs in continuous mode. Upon reaching the set time, the oldest images of the recording are overwritten.



The **primary brightness** setting is performed directly on the camera lens. Fine adjustments can easily be made using software through electronic **amplification** or the **exposure time** of the camera chip.



**Image height** and **width** can be set flexibly to optimize the image cropping and the achievable frame rates. The **rotate image** option (rotate the camera images in increments of 90°) also ensures maximum flexibility during camera installation on-site.

The frame rates of the cameras (**images per second**) can be defined in increments of 50 for adapting to the recording situation. The cameras also offer the possibility for higher frame rates (**reduced resolution**). Color cameras can be toggled between black/white and color mode.

# LIQUID LENS OBJECTIVE

**ELECTRONIC FOCUSING WHILE THE SYSTEM IS RUNNING**

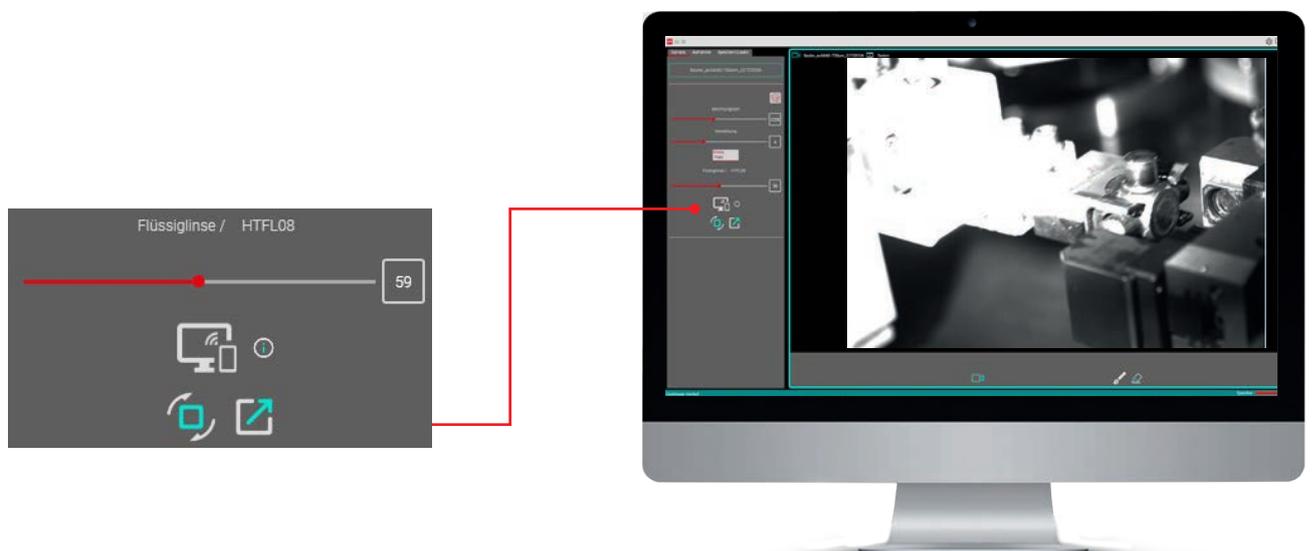
## ADVANTAGES

- / Compact design
- / Fast analysis through simple handling
- / Energy-saving
- / Vibration resistant
- / Control via the software on the PC or notebook
- / Less production losses due to shorter plant downtimes
- / Acquisition of processes with different distances
- / Easy focusing even in hard to reach places



To achieve sharp image reproduction, the lens of the high-speed camera in the system previously had to be adjusted manually. Of course, this presupposes that the system is freely accessible in the installation situation, which is not always the case in practice.

For applications where manual adjustment is not possible, the new **AO000619** liquid lens is now available. You can position the camera with the liquid lens objective in the system without having to worry about focusing. You then adjust the focus electronically via the software. The electronic setting also makes it possible to change the focus while the system is running, for example, in order to display other image sections sharply and to be able to analyze them more precisely.



# PLAYBACK FUNCTIONS

## DIRECTLY VIEW, ANALYZE AND FURTHER PROCESS RESULTS

After recording, the results are immediately available in playback mode. Current recordings can thereby be immediately viewed, analyzed in detail and, if necessary, further processed with an "edit function" to obtain only the relevant parts of a recording.

Recordings can be viewed immediately, whereby the **playback speed** can be adjusted using a slider. The **"maximum view"** option is used for optimum image display.

An **edit function** offers the option to adapt recordings individually. The relevant parts of the recording can thereby be processed and, for example, passed on to other persons.



The **sequence bar** always provides an exact overview of the current playback point; this can also be moved with the mouse during playback.



While a recording is being played back, the **individual image mode** can be activated with the "start/pause" button. The recording can be played image by image (forward and backward) by pressing the button.



**Compare recordings.** Using the software, up to four recordings can be displayed simultaneously and compared with one another. The playback points can be adjusted here individually (even during playback) and synchronized with one another.

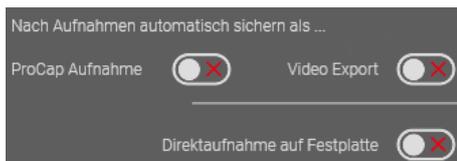
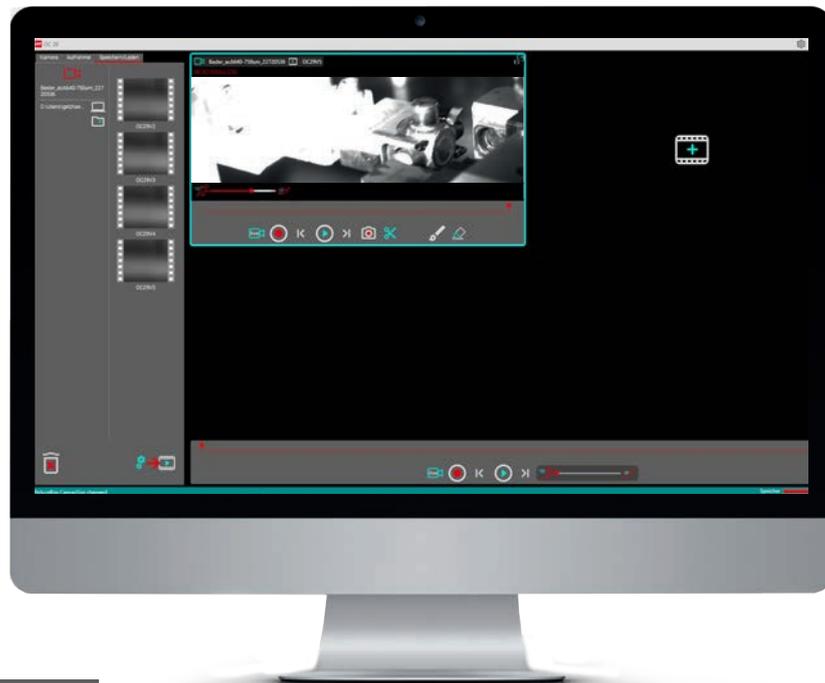


## **SHARING, SAVING AND EXPORTING** **SIMPLE COLLABORATION AND CONTINUOUS DOCUMENTATION**

With the **OC29**, the created recordings can easily be shared with others or stored for continuous documentation. The system offers multiple options for doing this: Saving in recording slots or export the recording to a video file.

The **recording slots** enable fast, convenient work with the recordings using the highest possible image quality.

The path to the recording slots can either be left set to "**default**" or a separate storage location defined with "**custom**".



The **video export** creates a file in avi format that is suitable for sending via email or that can be used for documenting the recordings. All additional information relevant to the recording (e.g., time stamp, signals from sensors) are also permanently stored when saving and exporting the video.

## APPLICATION EXAMPLE

# CONSISTENTLY HIGH QUALITY IN LASER WELDING

A company specializes in welding a wide variety of metal components using different welding processes. For quality control purposes, the company would like to assess the behavior of the molten metal during laser welding and, to this end, record the process with a camera and then analyze and document the results.

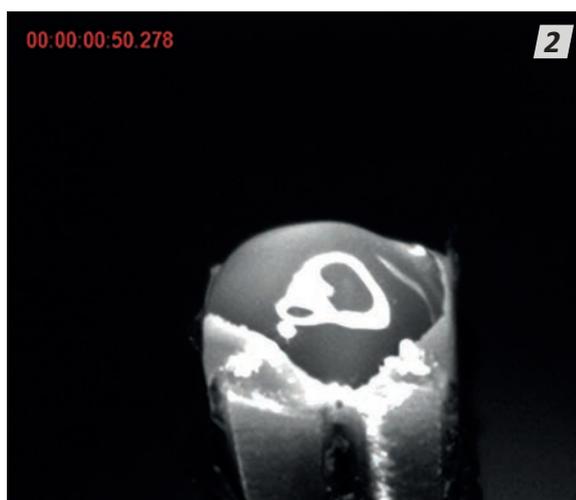
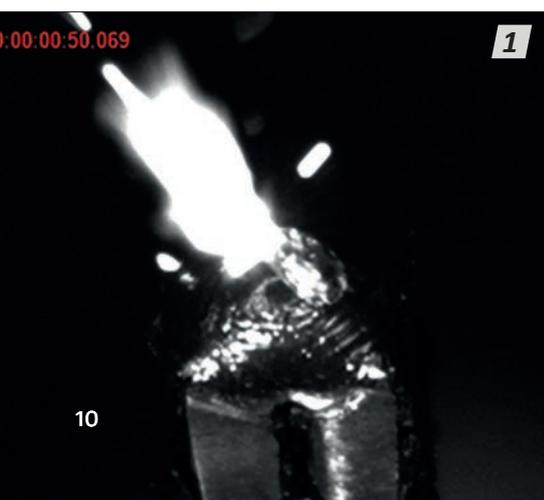
In connection with this task, the following problems arose for the company: During the welding process, the light emitted by the plasma causes a fade in one shot. Due to the overexposure, a large part of the image information is lost for the camera. In addition, the desired system must be able to capture the fast-moving process of laser welding in order to evaluate the result of the welding work in its details. In addition, there is not much installation space available for a camera system including lighting in the area where laser welding takes place. Therefore, the solution should be as compact as possible.

While searching for a suitable device, the company finally became aware of the extremely compact **OC29** high-speed cameras from ipf electronic. With these systems, fast-running industrial processes with very high frame rates can be easily recorded and analyzed. In combination with free software, possible causes for failures or errors, but also potentials for process optimization can thus be identified quickly, economically and in an uncomplicated manner.

As already explained, the light from the plasma causes fading during welding. For this reason, a combination of lens filters was used in this application for the **OC299725** camera (monochrome), which only allows the desired light to pass through for image acquisition. In order to still get enough light for a usable image capture, an additional illumination is used.

Based on previous experience with the systems, it has also proven useful not to install the illumination in the same direction as the camera, but to position it at an angle of approximately 90° to the detection area and also as close as possible but still at a non-critical distance.

Thanks to the high-speed camera from ipf electronic, the company can now precisely record the process during laser welding and, by analyzing the recordings, identify possible problems as well as potential for optimization. The recordings are also archived for complete documentation of the welding quality.



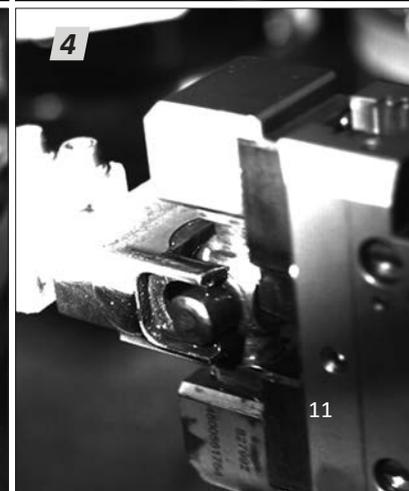
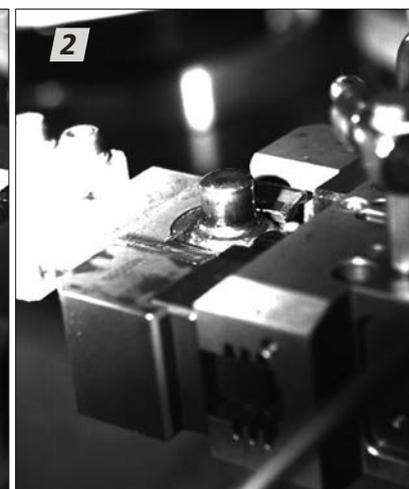
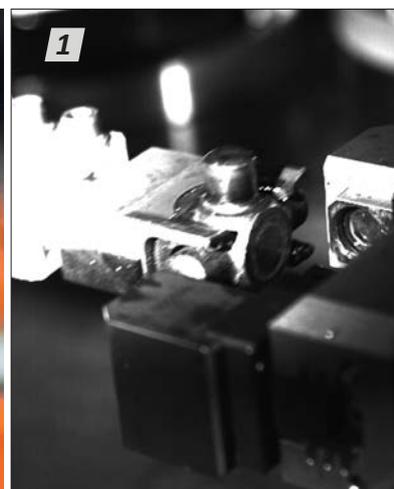
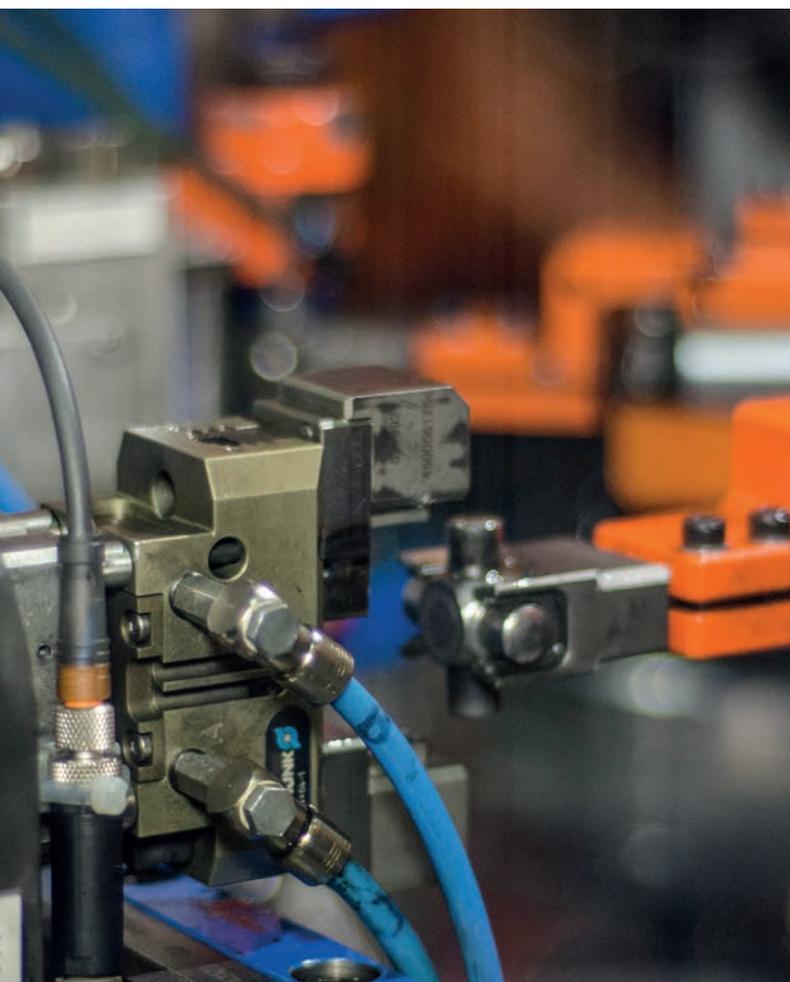
## APPLICATION EXAMPLE

# IMPRESSIVE IN PRACTICE

## **COST-OPTIMIZED PROCESS ANALYSIS SYSTEMATICALLY AUTOMATED**

In a metalworking company, universal joints of cardan shafts are machined on a rotary transfer machine and are rotated by 90° to various positions for this purpose. For the rotation, a turning unit approaches the universal joint holder, grips the workpiece, pulls it out of the holder by moving back, rotates the joint 90° and then returns it to the holder. To ensure that a universal joint is securely seated in the receiver, a retaining clamp is located at one of the two holding points for the joint pins. Some of these retaining clamps were damaged from time to time. Due to the high processing speed of the turning unit, however, it was not possible to identify the reason. The company therefore decided to install a high-speed camera from ipf electronic.

To record the turning process for an analysis that is both simple as well as targeted, the camera was connected to the PLC of the rotary transfer machine and coupled to the function of the turning unit. Recording began as soon as this unit approached the universal joint holder and stopped exactly when the joint, now rotated 90°, was placed back in the holder. This allowed the process to be observed in an automated manner, the individual sequences stored and the error source then very precisely analyzed. The problem was found within a short time: Due to the high dynamics of the gripper when rotating in the turning station, the universal joint shifted adversely such that when placed back in the holder, the retaining clamp bent. The problem could be rectified by optimizing the gripper and a permanent solution thereby found – easily, quickly, efficiently and affordably.





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