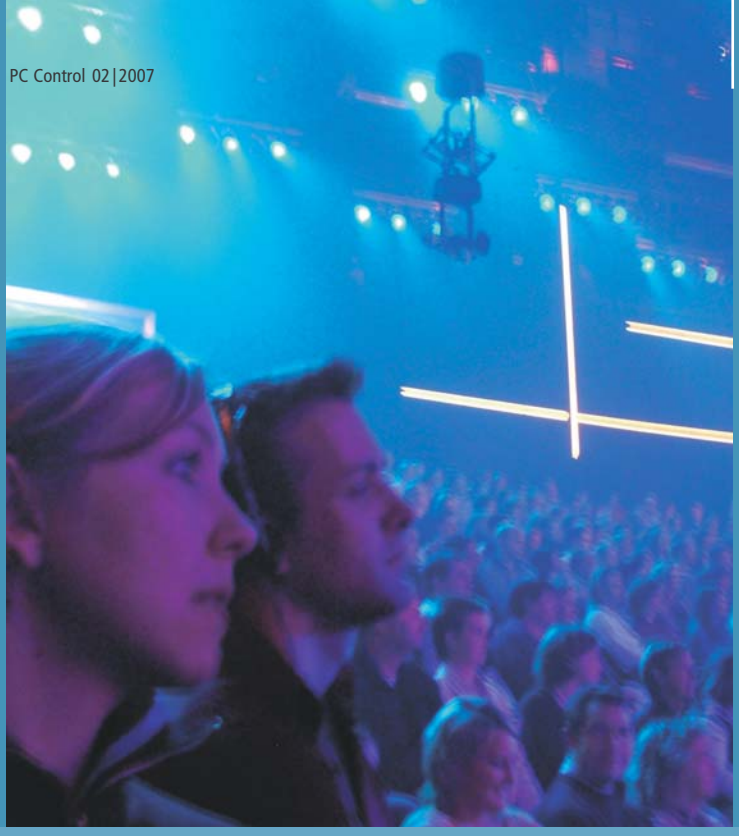


spidercam GmbH develops a new camera carrier system

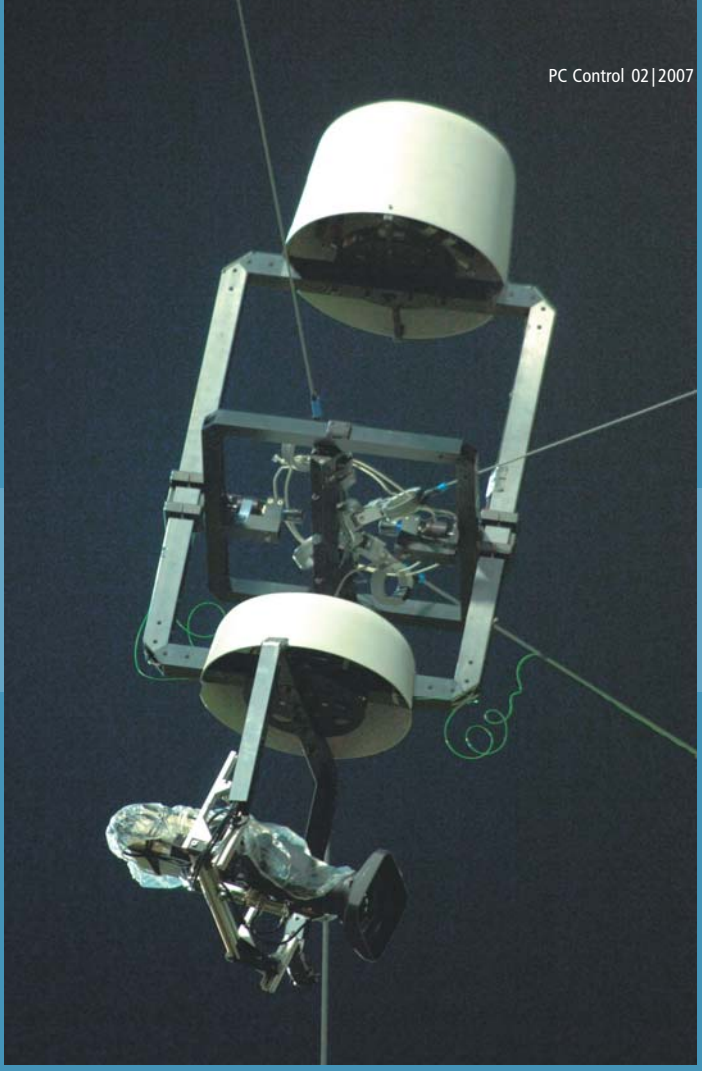
PC-based Control becomes a film star

spidercam GmbH, with headquarters in Villach, Austria, has developed an innovative camera carrier system. Attached to four cable winches, the system, which has been named SpiderCam®, allows the camera to move three-dimensionally through space. The company is relying on PC-based control technology from Beckhoff in order to control and drive the winch system.

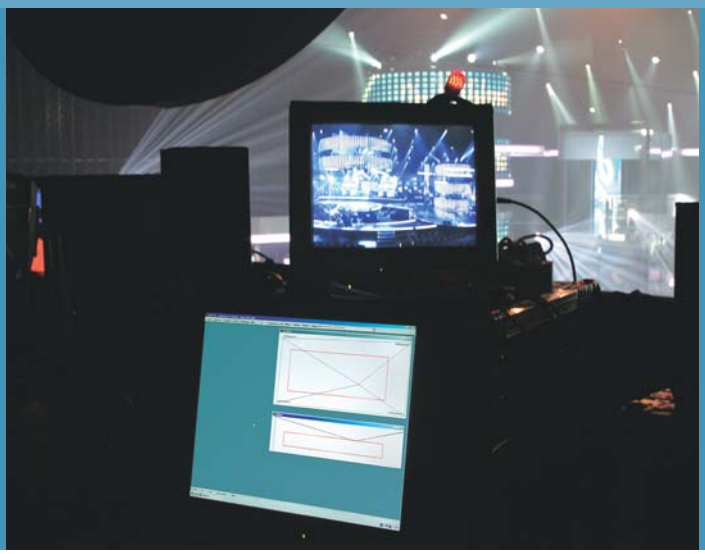
The SpiderCam® was used regularly in competitions of "Deutschland sucht den Superstar" (Germany in search of the superstar), transmitted live every week from the Coloneum Studios in Cologne, Germany. At the Echo Awards in Berlin, Germany, the camera robot provided remarkable pictures as well.

The development of the SpiderCam® was to achieve camera movement freely through space without worrying about obstacles on the ground, without getting in the way of the audience's view of the scene and without creating a hazard. To deliver its spectacular pictures, the camera has to move quickly, both close to the ground and at dizzying height, taking pictures from perspectives that a conventional camera cannot achieve.

In the SpiderCam®, the company of the same name has developed a camera robot that moves the camera freely in every direction, like a remote-controlled



Different cameras can be fitted to the camera head, or dolly, according to need. The image signals are transmitted to the director's booth or the transmitter van along the glass fiber that is embedded in the plastic cables.



Online display provides accurate information about the exact position of the camera at all times. The SpiderCam® is controlled by two joystick units.

aircraft. A cable winch system can be attached to four masts, to the ceiling or to other available fixed points to hold the camera in the desired position. Cable winches that shorten and lengthen the cables and coordinated controls drive the system, making it fast and agile. Speeds of up to 9 m/s (32 km/h) are possible.
The specially manufactured cables are made of plastic. A glass fiber cable is woven into them that transmits the image data (SDI or HD-SDI) to the ground without loss of quality. A light sag of at most 10° in the cables means that they only support the weight of the camera head or dolly. There is no pre-stressed support cable. The desired straight flight-path is created by simultaneously winding and unwinding the four motor-operated cable winches.

Embedded PC with Windows CE operating system

In order to control this complex process, spidercam GmbH is using a CX1000 Embedded PC running Windows CE as an operating system for the central controller. Special algorithms are used to calculate the cable lengths. This data is read into the TwinCAT NC PTP automation software through external specification of set values.

Ing. Jens C. Peters, General Manager of spidercam GmbH, explains the reasons for the cooperation with Beckhoff: "It was important for us to construct a modular control system that is easy to operate and works with open standards, so it can be integrated effectively into our overall scheme. We received a solution from Beckhoff that matches our needs exactly. Beckhoff's engineering experience also gave us valuable assistance that contributed to the development of the SpiderCam®."
Safety is of particular importance, particularly at public events. For the sake of exciting pictures, the SpiderCam® must often fly immediately above the head of the audience. If one of the cables were to fail, the load would be picked up by the other three cables – the two opposing cables would take up the load, while the third cable prevents or minimizes oscillation; the system would then shut down quite automatically. To prepare for a power failure and the consequent possibility that the cables could freely unwind from the winches, each winch has two entirely independent automatic brakes. The braking force is applied by steel springs, so that even if the power fails, the brakes will automatically be applied without the need for any external power.

Each winching station includes a cable winch weighing 200 kg, driven by an AX2000 Digital Compact Servo Drive and Synchronous Servomotors. A CX9000 Embedded PC with integrated TwinSAFE terminals performs the distributed control of the extremely compact winch stations.

SpiderCam® technology is particularly valuable at large events like soccer games. The unusual camera perspectives give the television viewer the feeling of being right in the thick of things.

The cable winches are driven by Beckhoff AX2000 Servo Drives with Ethernet interfaces and Synchronous Servomotors. "After reliability and speed, low noise was very important to us", added Peters. "There should, after all, not be any interference to the TV production."

Each winch station incorporates a CX9000 Embedded PC with TwinCAT software that communicates through network variables with the CX1000 in the central control unit. Integrated TwinSAFE I/O terminals ensure maximum safety, particularly at critical times such as commissioning or when under manual control.

In spite of the complex technology, it is relatively easy to use the SpiderCam®. Only two people are needed to operate the camera system. While one flies the SpiderCam® through space with the aid of a joystick, the second operates the camera itself. A control monitor with online display provides accurate information about the exact position of the camera at all times.

Flexible: from soccer to casting shows

The SpiderCam® can be used in studios and indoor halls as well as at outdoor events. The cable system permits a maximum activity area of 250 x 250 m over which the camera robot can travel to any position, including vertically. The camera moves can be controlled live or can be programmed in advance and worked through at variable speeds.

A SpiderCam® can be hired in Germany through PMT in Hamburg. Viewers were able to enjoy the exciting pictures already taken by the SpiderCam® in recent months at television broadcaster RTL: The competitions for this year's series of "Deutschland sucht den Superstar" (Germany in search of the superstar), which is similar to the American Idol and Pop Idol series, was filmed with the SpiderCam®, as was the Echo Awards ceremony in Berlin. The fact that the Echo ceremony was held between two "German Superstar" shows did not cause the operators much trouble: the entire camera system can be dismantled within a few hours and – depending on circumstances – be reassembled again at a new site within 1–2 days.

→ spidercam GmbH **www.spidercam.tv**
→ PMT **www.spidercam.de**
→ Beckhoff Austria **www.beckhoff.at**