



■ Safety Operations

A Safe Hookup

In the helicopter training center of the Bad Tölz mountain rescue service, rescuers can learn to handle wind, weather, and the winch. A comprehensive safety concept utilizing the features of Sinamics and Simatic components ensures safe training conditions.

After six years of planning, tests, and investigation, the mountain rescue service of Bad Tölz built a helicopter training center that opened officially at the end of 2008. The decisive advantage of the system is that with it, both test flights can be simulated and rescue operations can be practiced. These usually include rappelling from the winch on the helicopter and picking up persons. "For this reason, we had to choose a hall or structure that has at least 12 m below the skids," Thomas Griesbeck from the Bavarian Mountain Rescue Service reports.

The hall in which the helicopter cell is moved three-dimensionally by a typical hall crane is 60 m long, 25 m wide, and 20 m high. Transparent walls give the pilot the visual sense of real flight in the open air. The flight of a helicopter is simulated by a hall crane system that is equipped with redundant absolute value encoders and therefore measures the position of the helicopter cell at all times. Since people are dangling on ropes beneath the helicopter, safety precautions are extraordinarily high. A representative of crane manufacturer Brunnhuber Krantechnik says, "We had to implement a number

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of special safety features to get the OK for the training facility from the employer's liability insurance association and the German TÜV."

Focus on safety

Fail-safe Sinamics G120 frequency converters were used for the electrical drives of the crane's main axes to increase safety. The converters can be used for applications up to safety category 3 according to EN 954-1 or SIL 2 according to EN 61508. The Sinamics G120 frequency converters support the Profisafe safety protocol, so the main drives could be easily integrated into the completely Profibus-based control architecture of the helicopter training facility. "This is an immense advantage," the Brunnhuber Krantechnik representative stresses. The system is controlled by a fail-safe PLC S7-300 CPU 319F-3PN/DP. This efficient setup enables the pilot to carry out very tricky flight maneuvers. The helicopter in the helicopter cell contains two dedicated Simatic controllers that continuously calculate the position of the cabin in the XYZ coordinate system. Distributed Simatic ET 200M I/O units measure input and output signals for support via Profibus.

The converters allow a Safely Limited Speed and a Safe Stop 1 in the motion drives and the rotary mechanism without sensors. They also ensure a Safe Torque Off and a safe brake control feature for all drive units. "This was particularly important because the system should throttle the 'flight speed' appropriately on approaching a danger zone," Griesbeck says. "For this reason, we programmed three differ-

ent motion speeds on the crane system, which must be maintained safely," the Brunnhuber Krantechnik spokesperson adds.

A large disk brake on the lifting gear protects the helicopter against diving suddenly. Both the cockpit and a radio remote control are equipped with two-channel emergency stop buttons. On pressing an emergency stop button, all the drives are disconnected from the mains at all poles on the main

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current side, and all brakes are engaged. In case of an error, all the motion drives are shut down by the safety-oriented Safe Stop function integrated into the frequency converters.

The pilot can monitor and request all data in the cockpit on an MP370 Touch Panel during the flight. Via a Profibus cable, the data traffic is modulated onto the energy supply cables at high frequency and transferred from the helicopter to the control center by contactor lines. "In this way, we achieve 360° freedom of movement of the helicopter," Griesbeck explains. In descent, the released energy is fed directly back into the mains by the frequency converters. This functionality makes the entire construction interesting not only from an energy point of view but also in terms of space, because the devices can be built considerably more compactly than conventional solutions due to not needing brake resistors.

Training for lifesavers

Griesbeck describes the great value of this as follows: "When you are flying a helicopter in real conditions, there's no time to practice; every action has to be spot on to avoid accidents." In the new mountain rescue training center in Bad Tölz, the rescue teams can practice virtually all mountain rescue scenarios under maximum safety conditions. This innovative possibility in training helps the team prepare for real rescue missions so that they are able to perform better – and in their job, this means saving human lives. ■

The automation and drive technology

- ▶ Sinamics G120 frequency converters
- ▶ Parameterization: Sizer, Starter
- ▶ Fail-safe PLC Simatic S7-300/CPU 319F 3PN/DP
- ▶ Simatic ET 200M I/O
- ▶ Simatic MP370 Touch Panel
- ▶ Communication: Profibus, Profisafe

With the controllers for the Sinamics G120 frequency converters, even braking can take place in a fail-safe manner, using Profisafe



info

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