The Rofin-Sinar Group is an established global technology leader in the industrial laser sector. It is active in three lines of business: The „Macro“ division provides customers with high power laser machines for industrial material processing. An example here is vehicle panel processing. The „Micro“ business division focuses on the laser processing of parts ranging from small- and miniature-scale to µm-scale. The „Marking“ business division based in Bergkirchen, Germany is a global market leader in laser engraving. Non-contact permanent precision laser engraving on almost any kind of material is commonplace in a wide range of industrial manufacturing sectors.

**Laser marking – from power saw to microchip**

The Rofin-Sinar Marking Group manufactures a large number of laser systems. The spectrum ranges from compact diode-pumped Nd:YAG and Nd:YVO4 lasers with wavelengths of 1064, 532 and 355 nm through to CO2 laser systems for quick precision engraving of diverse inorganic and organic materials. The lasers are integrated into production lines by plant engineers. The Bergkirchen division also manufactures complete laser systems – a business which is growing fast. The user can choose from a portfolio of series ranging from the compact desktop device with a 60 x 60 cm footprint through to the „CombiLine Advanced“ series designed for 24 hour operation and marking workpieces of diverse sizes and weights. The objects these machines can engrave include power saw blade guides, high quality precision watch parts, photovoltaic modules, medical technology components and semiconductor microchips.

**Task: Redesigning the protective equipment**

There is also an „RT“ version of the „CombiLine Advanced“ machine which has a rotary table. This version has the benefit that the user can mount the next component while the first one is still being engraved. A partition on the rotary table divides it in half to ensure laser processing (laser class 1) takes place safely in the machine’s workspace. A risk which requires separate protection is that of being crushed or cut by the moving rotary table which has a diameter of either 800 or 1000 mm, depending on the model.

When this series was redesigned recently, those involved also looked at the protective equipment to see how it could be optimised. Josef Pfaffinger, head of systems and software engineering: „We started off evaluating different types of safety switchgear such as safety mats and optoelectronic protective equipment. It soon became apparent that the safety light curtain was still the best solution for the rotary table.“ This piece of safety equipment stops the rotary table as soon as the operator enters the hazard area.

**Wanted: A „quick“ safety light curtain**

Once the basic decision had been made, the search began for a safety light curtain with a specific characteristic. Stefan Albrecht, designer responsible for machine safety: „The distance between the safety light curtain and hazard area had to be kept as small as possible for ergonomic reasons. This meant a light curtain with a very quick response time was needed to keep the overtravel of the complete system to a minimum during operation.

With this in mind various safety light curtains were tested. The new SLC 440 series from Schmersal turned out to be the best device. Electrical designer Johannes Jorias: „Integration is straightforward and does not require any additional evaluation equipment. The switching capability of the safety outputs is adequate“.

During the redesign of its „CombiLine Advanced“ laser marking machines, the „Marking“ business division of laser specialists Rofin-Sinar also updated their safety concept. For example the hazard area in the machine’s loading area is now monitored by safety curtains from Schmersal. Their quick reaction rates meant the safety margin could be kept small.

Overtravel measurements verified the SLC 440 series’s quick reaction rate.

The rotary table version of the „CombiLine Advanced“ laser marking machine keeps cycle times short.
The collaboratively compiled safety concept was also optimised with respect to faster switching times. Stefan Albrecht: „The required and calculated safety margin between the light curtain and the hazard area was feasible.“

Overttavel measurement as „proof of concept“
Measurements carried out by Schmersal have shown that the actual value is consistently less than the calculated value – even when the machine is engraving heavy parts. Such overtravel measurements are part of Schmersal’s „Safety Services“, and Rofin-Sinar is very satisfied with them: „The advice and service provided by Schmersal was excellent“ according to statements on the company’s website.

Delivery of a pre-configured system
The SLC 440 devices are mounted behind a screen in the loading area so that they are practically invisible. With dimensions of 28 x 33 mm they are extremely compact and can be easily mounted in standard fixtures. An integrated seven segment display helps the electrician to make the correct adjustments. However, the parameters for this series of devices can be set directly on the device without any additional tools such as a PC. But Rofin-Sinar staff don’t even have to do this job as Schmersal’s optoelectronics competence centre in Mühldorf/ Inn, Germany pre-configures and prepares the safety light curtains to Rofin-Sinar’s specification so that they only have to connect them into the safety circuit.

Individual overtravel measurement
The new safety concept has proved its worth in the newly designed and manufactured machines. The quick-reacting and compact optoelectronics have also improved the „CombiLine Advanced RT“ ergonomics as the operator’s view of the loading area is now larger.

This explains why the enhancements achieved by the redesign have been well received by customers, particularly as Rofin-Sinar has documented the safety features. Josef Pfaffinger: „We measure the overtravel for each machine. By documenting the results users can be sure they’re on the safe side and that all normative requirements are complied with."

With integrated AS-i safety interface
The Schmersal Group launches its new SLC/ SLG 440 safety light curtain and grid at SPS IPC Drives 2014. This device is equipped with an AS Interface Safety at Work“ (AS-i Safety) interface. It contains all the functions of the basic version such as fixed blanking with and without a movable outer zone, floating blanking of one or two beams as well as diverse muting variants.

Being directly embedded in AS-i Safety networks means, for example, the devices can be easily integrated into complete communications networks such as those with the „safety separated“ or „safety integrated“ architecture. However, the SLC/ SLG 440-AS series of optoelectronic protective equipment facilitates faster installation using yellow AS-i flat ribbon cable and enables a considerably denser flow of information, for example during requests for diagnostic-relevant information.

Business computer scientist Josef Pfaffinger, systems and software engineering manager at Rofin-Sinar Laser GmbH and engineering graduate Stefan Albrecht, designer responsible for the machine safety of the „CombiLine Advanced“ series.