

SCANmotionControl

More degrees of freedom for laser process control

LASER World of **PHOTONICS**
Innovation Award 2023

Nominated in category:
 Laser systems for industrial production engineering

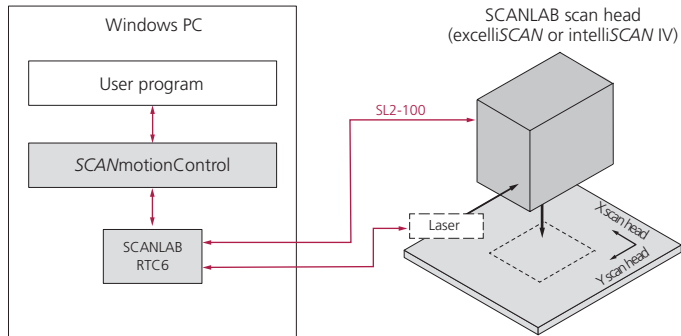


SCANmotionControl

Optimal Control of Laser Processes

SCANmotionControl calculates optimum trajectories from specified machining patterns and process parameters, taking into account the physical limits of the scan head. For example, the tolerable rounding of corners can be defined or a constant process speed can be specified.

This achieves an optimum processing result with minimum laser-off times without time-consuming optimization loops.



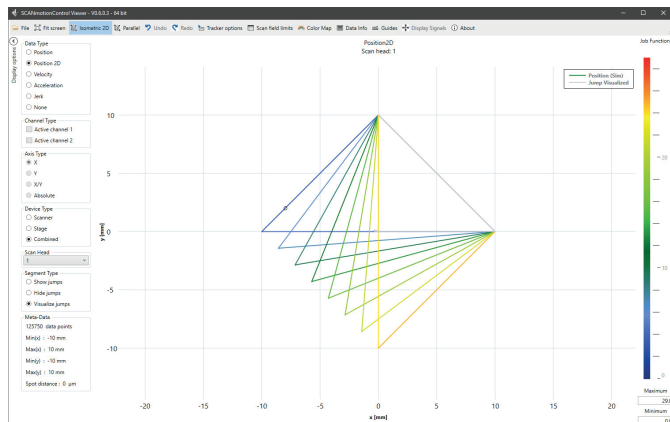
Benefits

- Highest precision and exact laser control by trajectory planning
- Shortest process times through optimal use of scanner dynamics and laser power
- Advanced Spot Distance Control (SDC) function
- Simple job planning and simulation: 'What you see is what you get'
- Multi-head and multi-instance capability (up to four scanners)

Programming and Integration

SCANmotionControl is a dynamic program library (DLL), whose user interface is designed in such a way that existing application programs for RTC6 control cards can be ported easily. The API functions of the SCANmotionControl-DLL allow definition, loading and execution of process jobs, the configuration of system parameters, status monitoring and the use of event callbacks.

For program execution in real time, SCANmotionControl uses the RTC6 control board.



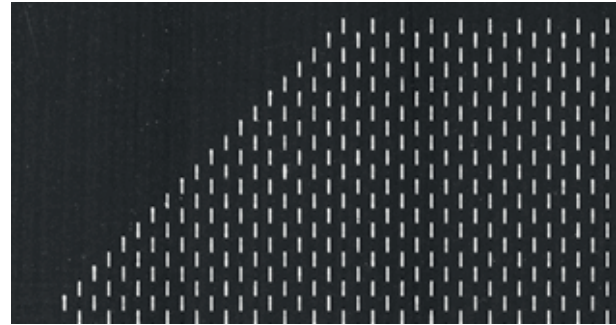
Simulation

SCANmotionControl trajectory planning allows scan path and velocities to be optimized in a simulation environment. The SCANmotionControl viewer allows evaluating the simulation results and displaying the position and dynamic values of the scan head as well as the laser control signals.

Sub Cycle Switching

In order to achieve exact positioning and homogeneous energy input for short scan lines with high scan speeds, path-synchronous switching of the laser is crucial.

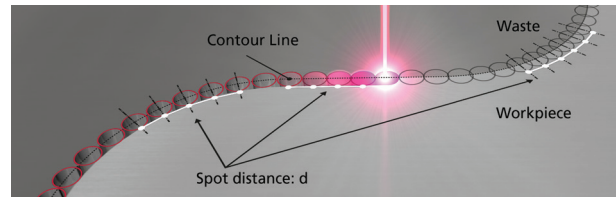
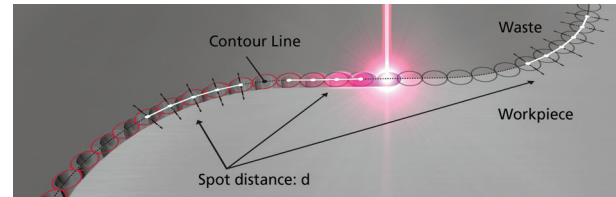
With *SCANmotionControl* and the Sub Cycle Switching-function of the RTC6 control board, that enables up to ten switch-on and switch-off events within 10 μs , such processes can be executed extremely quickly and precisely.



Advanced Spot Distance Control Functions

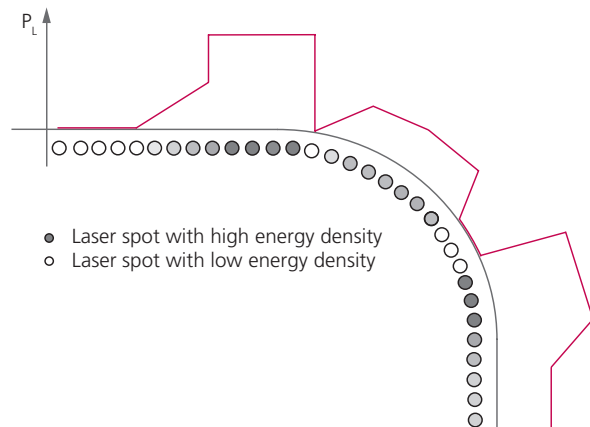
Spot Distance Control (SDC) is an innovative feature of the RTC6 control boards to keep the laser pulse spacing constant along any scan pattern. With a resolution of 64 MHz, SDC triggers laser pulses to maintain the desired pulse spacing.

In combination with *SCANmotionControl*, SDC can be expanded to contour-dependent laser control. The constant distance can be aligned either along the centerline of the laser pulse chain or tangential to the workpiece's side. This means that inhomogeneities or burn-in can be avoided, even on sensitive materials, and a uniform workpiece edge can be achieved.



Power Ramping

Additional flexibility is provided by the position-accurate variation of the laser signal (power ramping). Depending on the requirements, the course of an analog signal for power control can be defined along the markings. Even multiple parameter changes and jumps for individual vectors are possible.



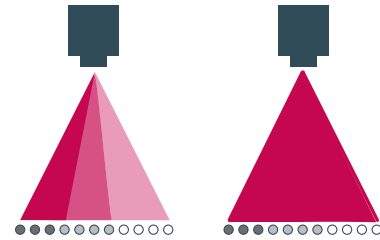
High Precision Laser Control

SCANmotionControl enables precise synchronization of the processing path and laser parameters. Assuming a suitable laser, users can specify not only the minimum or maximum process speed, but also the pulse spacing and energy density of the laser spots in relation to their position. The software then calculates the optimum combination of scanner and laser control.

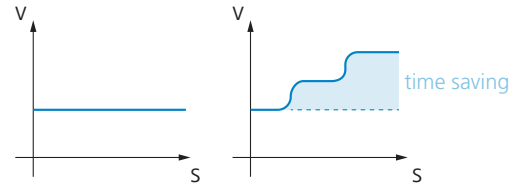
The degree of freedom of laser power is used in combination with the scan speed to realize a defined energy input with minimum processing time.

Laser power

■ high
■ low



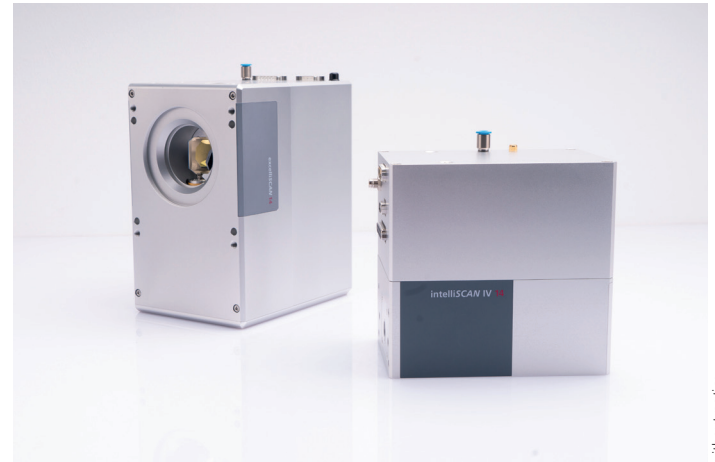
Speed



Ready for SCANmotionControl

All scan heads of the excelliSCAN- und intelliSCAN IV series are prepared for use with SCANmotionControl, since they can follow dynamically constrained trajectories without tracking error.

The use of SCANmotionControl in existing machine concepts therefore only requires a software adaptation. Contact us to learn more about the possibilities!



More information in the SCANmotionControl video: