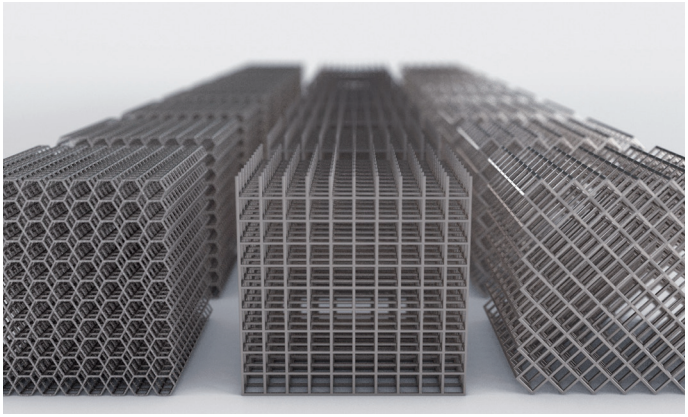
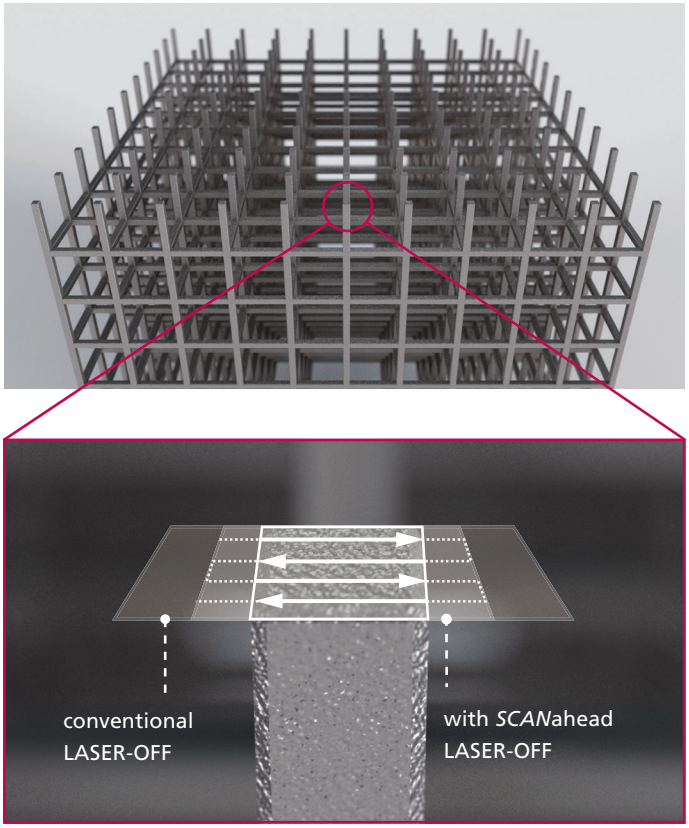
excelli*SCAN* Series with *SCAN*ahead Technology

Process Accelerators for Additive Manufacturing

SCANLAB
innovators for industry

*SCAN*ahead – Innovative Scanner Control





***SCAN*ahead control shortens acceleration and deceleration paths**

High-End Systems for Additive Manufacturing

Powder-based 3D printing offers maximum component-design flexibility. Additive manufacturing enables fabrication of modern, lightweight structures, such as used in the automotive and aerospace industries.

Industrial laser processing systems for 3D printing have long relied on SCANLAB scan systems to guide the focused laser beam precisely and with high dynamics across a powder bed, thereby melting defined areas.

*SCAN*ahead Control Boosts Productivity

Faster 3D printing throughput is conventionally achieved by utilizing multi-head systems or higher laser power. But additional potential is offered by modern technologies such as SCANLAB's *SCAN*ahead servos, which can significantly cut process time via much shorter LASER-OFF periods. This effect is particularly pronounced for filigree component structures.

Grid structures are typically fabricated by guiding the laser focus in bidirectional scan vectors over the numerous small areas to be processed. The large number of short scan vectors requires a high proportion of acceleration and braking periods (LASER-OFF). *SCAN*ahead control enables much higher dynamic performance than conventional servos. The result is shorter paths during LASER-OFF times (see figure lower left).

High Throughput Thanks to High Acceleration

*SCAN*ahead control allows scan systems to deliver full acceleration independent of the scan speeds (i.e. with minimum acceleration duration t_a). The galvos' dynamic performance potential is optimally utilized.

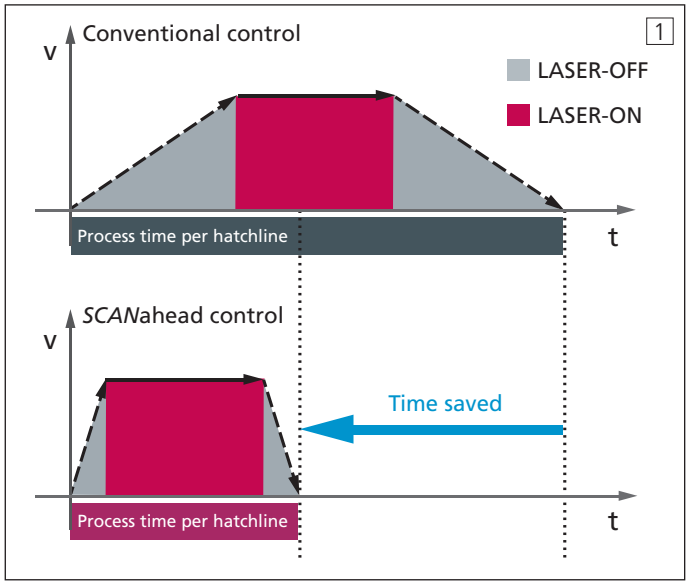
The rapid accelerations sharply shorten acceleration periods and braking periods. This significantly reduces the time during which the laser remains switched off at each hatch line (see diagram 1).

This cuts process time and also boosts productivity, without requiring changes to process parameters (process speed, laser power etc.).

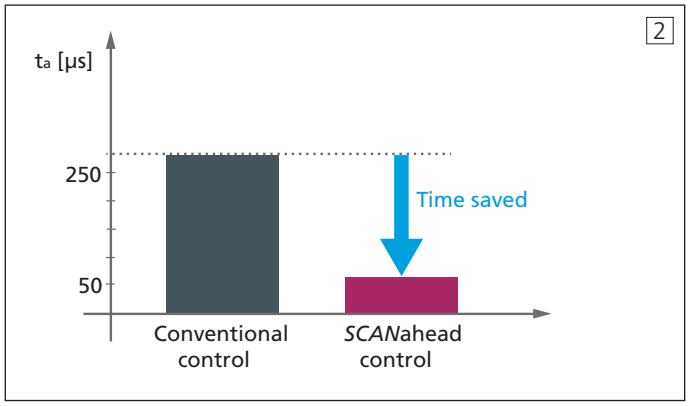
Compared to conventionally controlled scan systems, *SCAN*ahead servo control can reduce LASER-OFF time (= acceleration time t_a) by approx. 80% at a scan speed of v_{scan} = 1m/s (see diagram 2).

*SCAN*ahead Control's Advantages in 3D Printing

- Boosts productivity via significantly shortened acceleration times
- Reduces process time with no need to change process parameters
- An universal tuning assures maximum user friendliness – no delay adjustments necessary!
- Highest accuracy (contour fidelity) and long-term stability thanks to the latest digital encoder technology – even for challenging scan jobs



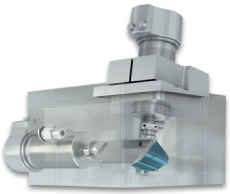
With unchanged LASER-ON times, *SCAN*ahead control significantly shortens LASER-OFF times (acceleration and braking).

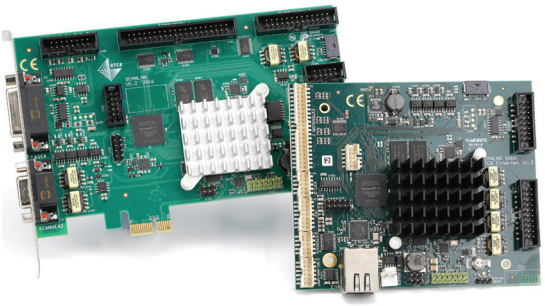


Reduced acceleration time with S*CAN*ahead control*

*Simulation results are based on system with 14 mm aperture and f=500 mm.

New!





excelli*SCAN* 20 – Highlights

- New mechanical design with strict spatial separation of optics and electronics
- Air-cooled mirrors allow usage even at high laser powers
- Optional integrated sensors provide mirror and system temperature monitoring for enhanced process safety

Additional excelli*SCAN* family advantages

- Digital galvanometer scanners with 20-bit technology for maximum positioning accuracy and long-term stability
- Digital output stages deliver ultimate performance and efficiency
- Optimized mechanics and cooling for improved long-term stability
- Convenient and simple commissioning (setup and parameter determination) thanks to universal tuning and automatically defined scanner and laser delay settings

RTC6 – Control Board for *SCAN*ahead Systems

SCANLAB's powerful RTC6 control board supports all excelli*SCAN* scan system features, and offers the following additional advantages:

- Ethernet variant
- *SCAN*alone functionality (available Q1/2020)
- Improved processing-on-the-fly functionality for ultra-precise processing of moving workpieces
- New Spot Distance Control (SDC) function allows precise laser processing even during acceleration and braking phases when used with pulse-on-demand lasers

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