CORNING LASER TECHNOLOGIES announces laser technology to cut advanced architectural glass in a single pass

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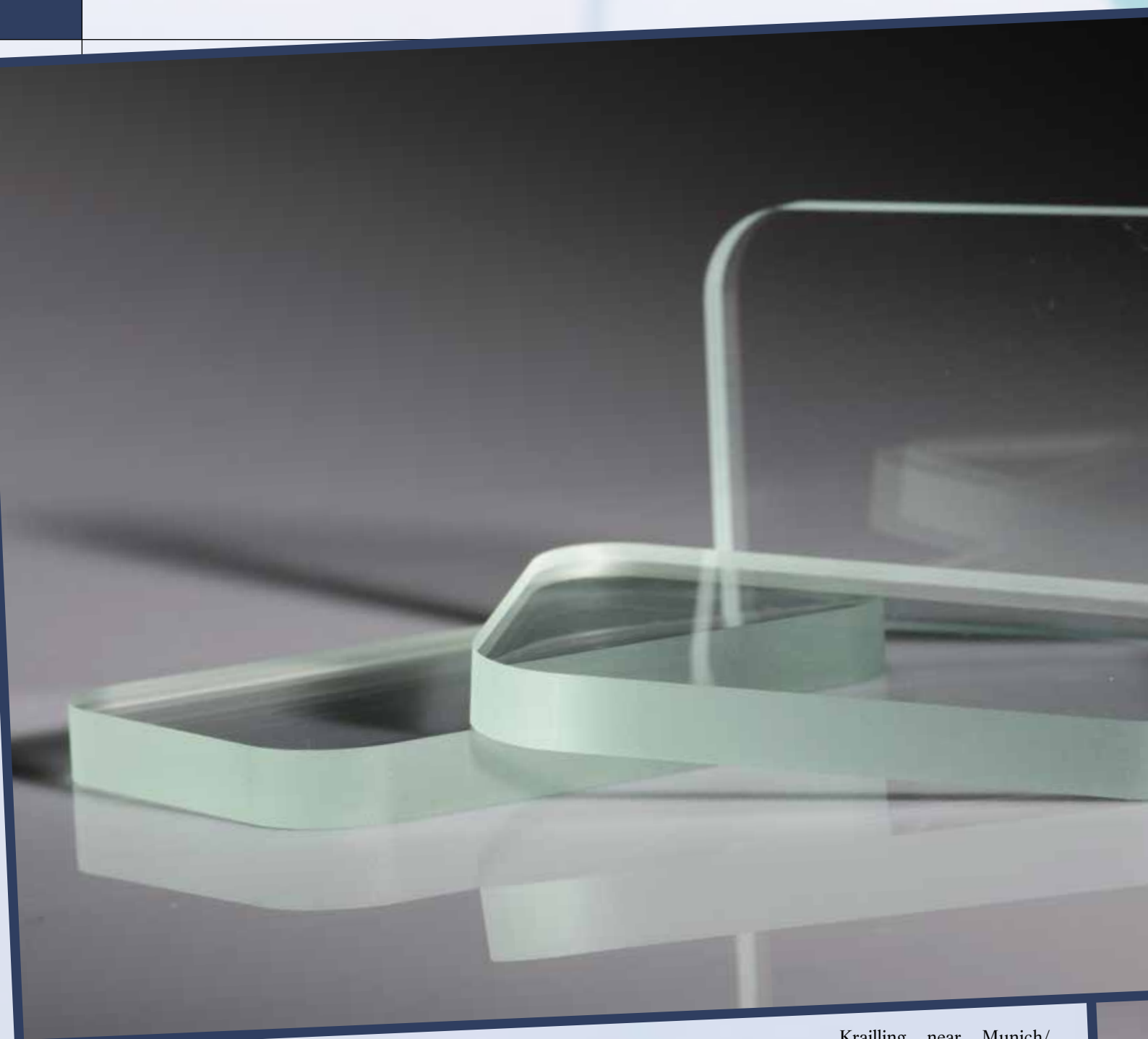
DEVELOPMENTS IN LASER GLASS CUTTING CREATE ADVANTAGED POSSIBILITIES FOR THICK AND VALUE-ADDED GLASS, SUCH AS SMART WINDOW APPLICATIONS

New structural and design features in advanced architectural glass, including smart window applications, are increasingly difficult to achieve with conventional



glass-cutting methods. Ultrashort pulsed lasers offer the possibility for a very confined energy deposition, resulting in high-quality laser cuts. With advancements in laser technology and commercial availability of industrial, ultrafast laser sources with even higher power and pulse energy, Corning Laser Technologies GmbH is able to scale the laser-cutting performance, enabling thicker glass materials or functionalized and stacked glasses to be accurately cut at high processing speeds. The new capability can also be used to cut complex shapes, coated glass, and stacked glass structures, such as those used in smart windows.

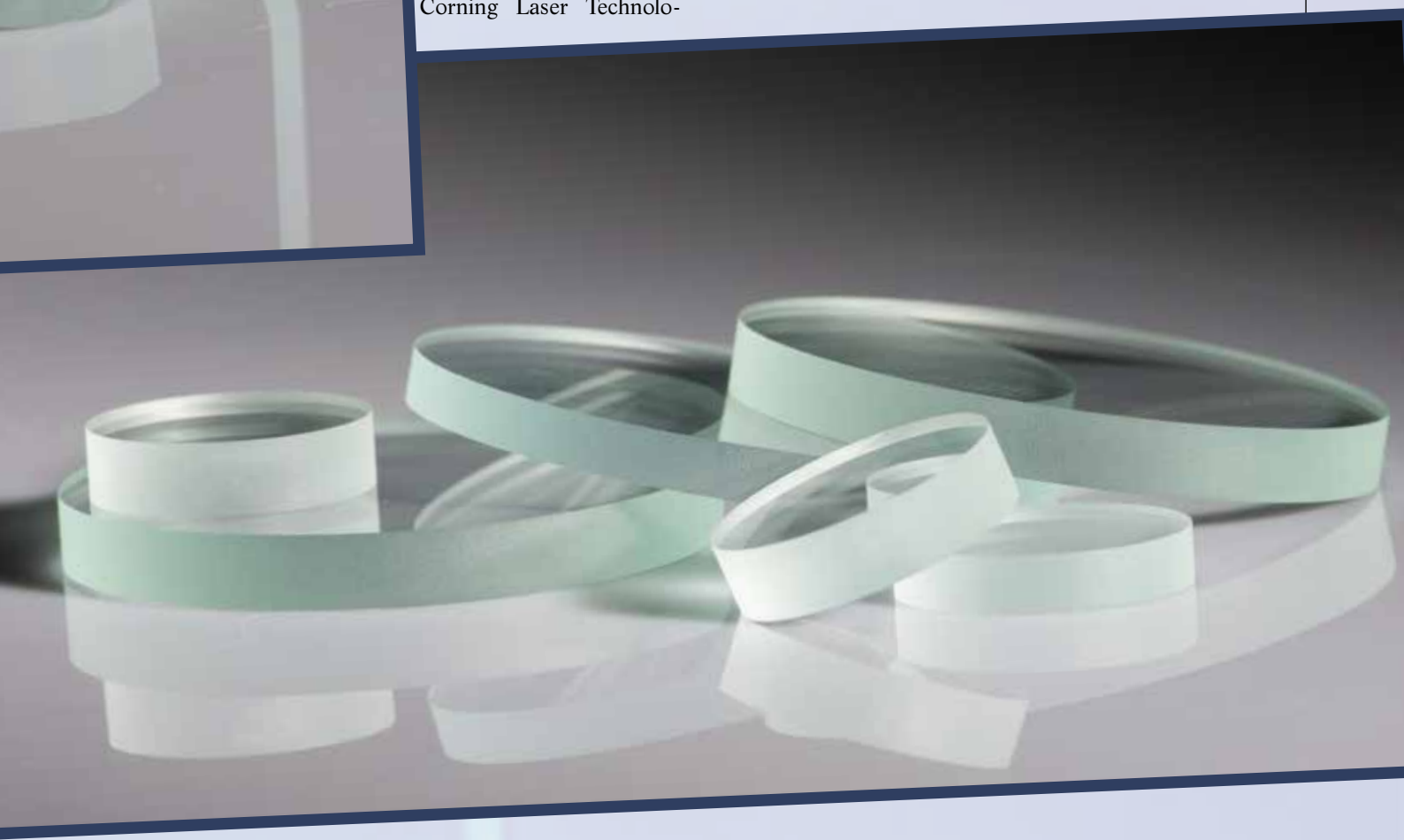
CORNING LASER TECHNOLOGIES

Corning Laser Technologies GmbH is located in Krailling near Munich/Germany. The company offers innovative laser glass cutting and drilling technologies with a distinct advantage over conventional processes, leveraging more than 25 years of experience in precision laser machining. Their laser glass processing systems have the

ability to cut and drill 2D and 3D-shaped glass, such as Corning® Gorilla® Glass, Lotus™ NXT, and Eagle XG® glass, as well as other chemically strengthened and non-strengthened glass types including soda-lime and other brittle materials. The portfolio is rounded off with a new product line for glass wafer dicing that allows CLT to support the semiconductor application space to further focus on microfabrication processes. The machine platforms serve a wide range of emerging applications that require precise and flexible glass processing technologies. They are designed for 24/7 operation in an industrial environment. Conceived for substrate sizes from 10mm x 10mm up to 2.5m edge length and glass thicknesses up to 10mm, Corning Laser Technologies enables flexible adaption to individual customer design requirements.

CORNING® NANOPERFORATION PROCESS

In 2012, Corning Laser Technologies invented a unique glass cutting process: a specially tuned laser is used to perforate 2D and 3D-shaped glass, such as Corning® Gorilla® Glass, Lotus™ NXT, and Eagle XG® glass, plus other chemically strengthened and non-strengthened glass types including soda-lime and other brittle materials. The process employs ultrashort laser pulses in the picosecond range, utilizing nonlinear processes. The glass substrate is nanoPerforated all the way through the entire thickness. In a second step, a CO2 laser beam follows the nanoPerforated contour, resulting in a thermo-mechanical stress profile, which in turn causes a clean separation along the cutting contour. This debris-free process delivers precise, high quality cuts with minimal surface roughness and high uniformity. Smooth edges, high break strength, multilayer stack and near-net shape cutting as well as maximum material utilization are additional benefits worth mentioning. The process was further developed and in 2019, CLT invented a new optimized beam shaping technique. This Enhanced nanoPerforation process was developed to tailor the spatial beam focus profile in the material and provides more precise control of the laser-glass interaction. This enables near-net shape cut-



ting of the most complex and demanding geometries and improved edge quality. Higher edge strength, lesser need for post-processing and improved break resistance are further benefits enabled by Corning's Enhanced nanoPerforation process.

LASER CUTTING OF THICK GLASS

Glass thicknesses of greater than 3 mm, which are common in architectural applications, have traditionally required multi-pass cutting. Although this method still delivers high-quality cuts, it compromises the throughput.
By using a high-power laser source and appropriately tailoring the temporal and spatial beam properties, CLT can shape the laser beam interaction zone within the glass to nanoPerforate through glass up to 10 mm thick in a single pass.

LASER CUTTING OF FUNCTIONALIZED AND STACKED GLASS

CLT's thick glass laser-cutting capability can also be used to cut functionalized, stacked, and coated glass. An actively switchable window consists of a stack of at least two glass sheets – the inner surfaces coated with a transparent conductive oxide (TCO) and the active material between. CLT optimized a process for the half-cut, obtaining the desired nanoPerforation of the upper sheet with minimum damage to the TCO layer of the lower sheet.
NanoPerforating the smart window glass stack in a single pass and using the process to minimize damage to the TCO layer of the lower sheet enables to streamline the smart window manufacturing process while allowing high design flexibility at the same time.

CORNING INCORPORATED

Corning Laser Technologies GmbH is part of Corning Incorporated, one of the world's leading innovators in materials science, with a 170-year track record of life-changing inventions and applies its unparalleled expertise in glass science, ceramic science, and optical physics along with its deep manufacturing and engineering capabilities to develop category-defining products that transform industries and enhance people's lives.

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