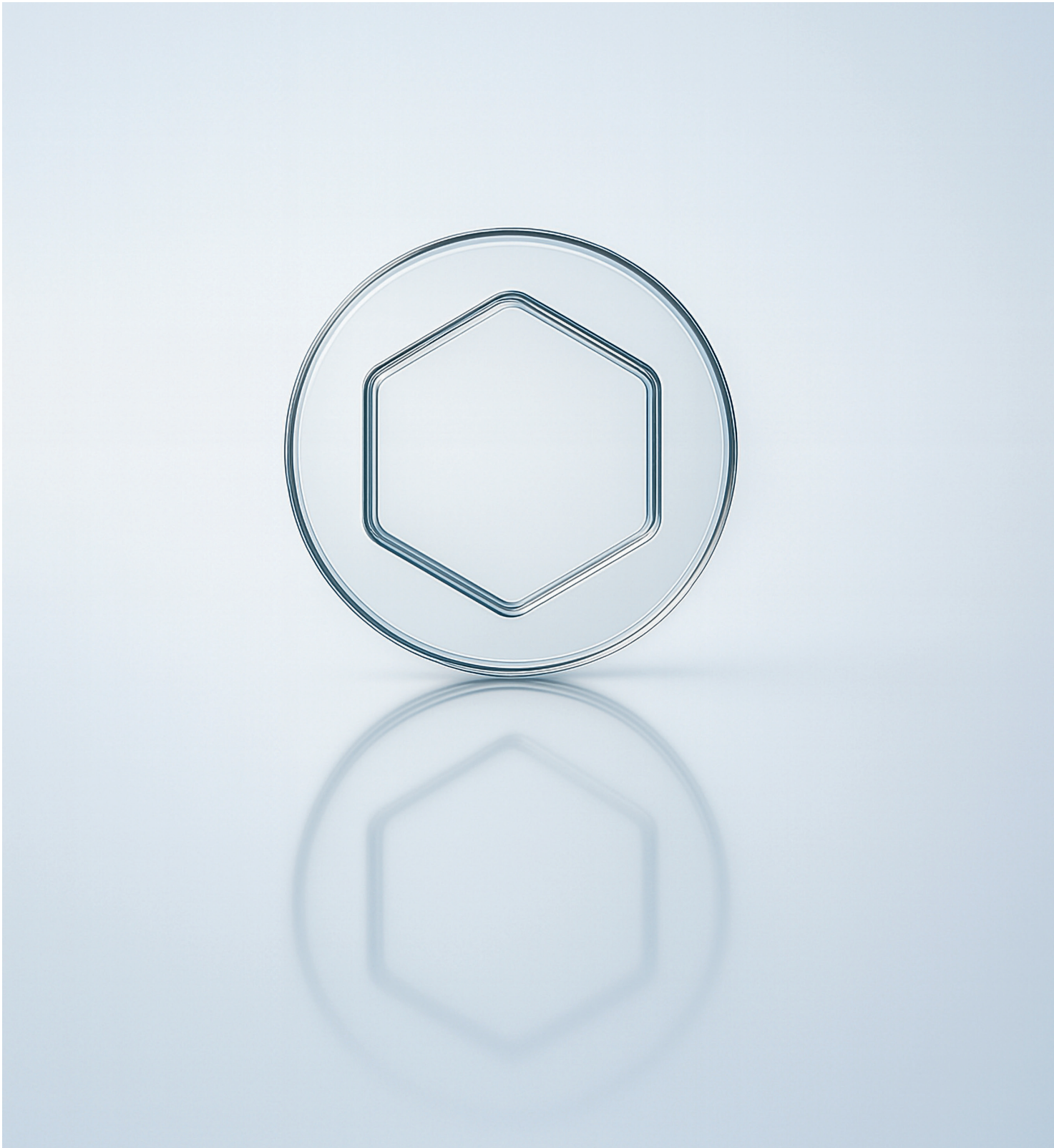
Ceramoptec®

FOR SUPERIOR ILLUMINATION

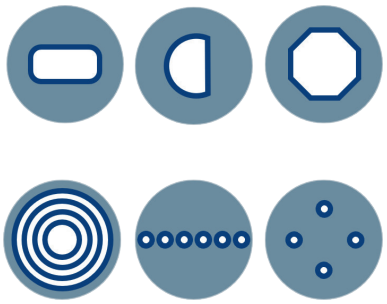
Non-Circular-Core Fibers & Assemblies



SPECIAL CORE GEOMETRIES

ENGINEERED FOR HIGHEST PRECISION

Non-Circular-Core (NCC) fibers or Non-Circular Fibers (NC) differ from conventional round-core fibers by their precisely defined core geometries, which are created during the preform manufacturing process. Possible designs include rectangular, square, polygonal, multi-core, or asymmetric shapes such as D-cores.



This unique geometry enables a highly uniform intensity distribution at the fiber output. In many applications, NCC fibers provide an efficient and cost-effective approach to achieving homogeneous laser intensity – delivering measurable improvements even over short fiber lengths.

BENEFITS AT A GLANCE

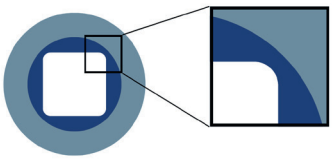
- Consistent beam quality – reproducible laser results with fewer errors and less rework
- Uniform illumination – sharper, clearer images for improved diagnostics in endoscopy
- Stable measurements – reliable spectroscopy data, even under fluctuating input conditions
- Precise coupling – adjusted core shapes to diode laser beam geometries
- Tailored performance – customized NA, core-cladding ratios, coatings and wavelengths

FROM PREFORM TO FIBER

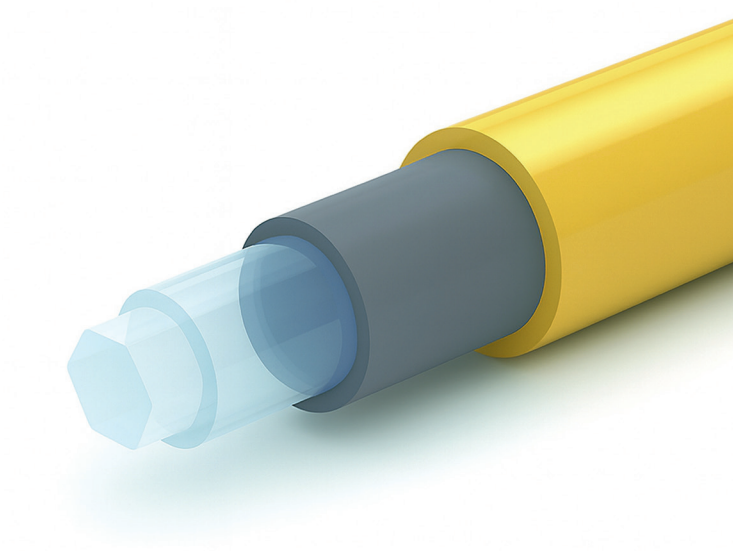
FULL MANUFACTURING EXPERTISE

Our manufacturing competence covers the entire process chain: from the mechanical shaping of the preform core, to cladding application, to precise fiber drawing under controlled conditions. Each step is designed to ensure reproducibility and outstanding optical performance.

This vertical integration enables us to react flexibly to customer-specific requirements, whether small-scale prototypes or high-volume production runs.



$r_4 = R/D_{in} * 100\%$



CORE OPTIONS

Ge-doped silica

Low OH silica

High OH

CLADDING

Fluorine-doped silica

Acrylate

JACKET OPTIONS

Metal coated	- 196 °C to +400 °C (Al)
Polyimide	- 190 °C to +350 °C
ETFE	- 40 °C to +150 °C
Nylon	- 40 °C to +100 °C
Acrylate	- 40 °C to +85 °C

HIGHLIGHTS

- Core geometry definition through mechanical shaping of the preform
- Edge radius control via flame-hydrolysis process (r_4 < 10 %, 10–20 %, >20 %)
- Application of F-doped cladding for optimized guidance
- Fiber drawing with continuous quality monitoring
- Optional: tapered fibers, double cladding, electrical wires, AR coatings

FLEXIBLE INTEGRATION OPTIONS

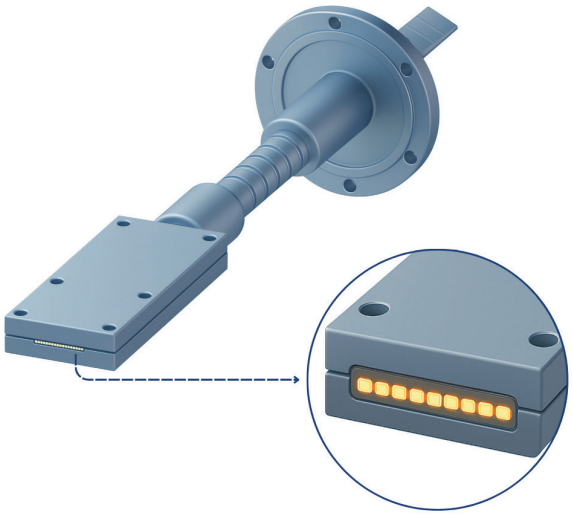
FROM SINGLE FIBERS TO 500+ BUNDLES

PROCESSING & ASSEMBLY

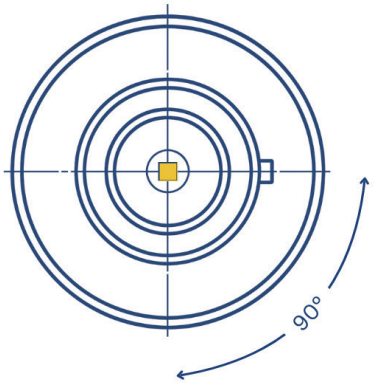
- Customized connector solutions
- Bundles with up to 500 inputs/outputs
- Bundle lengths up to 300 m available

Fiber ends can be customized:

- Glued for high mechanical flexibility
- Fused for maximum transmission efficiency
- Precisely sorted for defined fiber arrangements



Fiber array that aligns itself rotationally due to the external fiber geometry



Rotationally aligned fiber with index on the connector

ANTI-REFLECTION COATINGS

- In-house coating design and application customized to your needs
- Single AR (from 266nm to >1064nm)
- Double AR (980nm and 1,470nm)
- Broadband AR (from 350nm to 1,700nm)
- Wide Angel AR (up to 20°)

RELIABLE BEAM HOMOGENIZATION

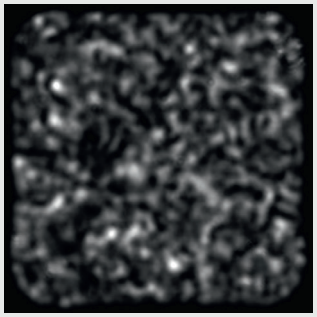
UNIFORM INTENSITY FOR PRECISION APPLICATIONS

Measurements demonstrate that fibers with rectangular or hexagonal cores homogenize the beam profile significantly faster than conventional round-core fibers. After as little as 50 cm, intensity variations are already balanced; beyond 2 m, the profile remains consistently stable.

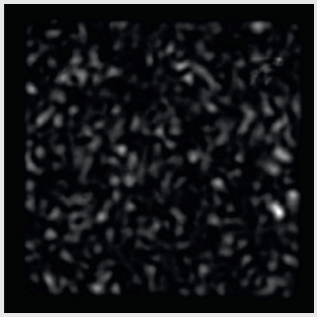
- Stable energy distribution without hot spots (High-Power Laser Processing)
- Uniform illumination to enhance image quality (Medical Endoscopy)
- Consistent signal stability, even with fluctuating input conditions (Spectroscopy)

LASER BEAM CHARACTERIZATION SETUP

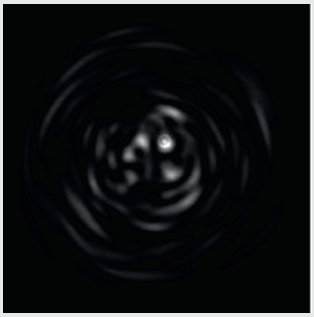
- Fiber Probe (looped 1x)
- He-Ne Laser (633 nm) light source
- Aspheric Lens for focus
- Collimator to align the beam for analysis
- Beam Profiler analyzes the spatial characteristics



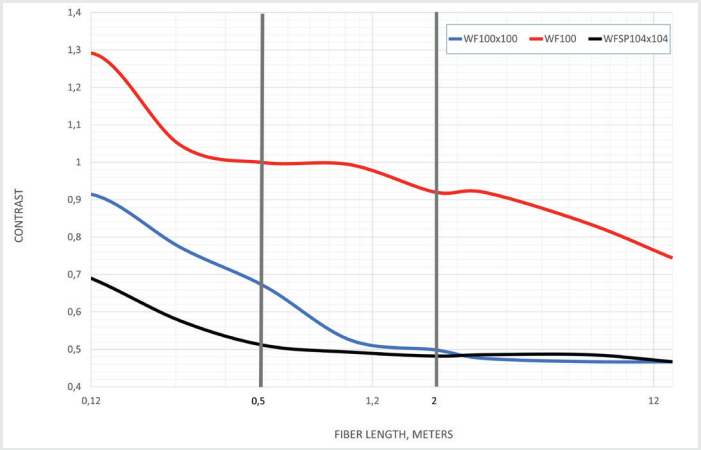
Square core 104 µm - patented design for mode mixing with round fibers



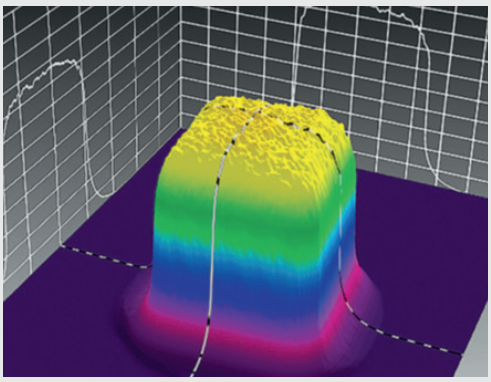
Square core 100 µm - typical NCC geometry



Round core 100 µm - conventional fiber reference



Contrast standard deviation – ratio of variation to average intensity



Fibers with rectangular core geometry homogenize the intensity distribution

TECHNICAL DATA

Wavelength / spectral range	
Optran® UVNCC Optran® WFNCC	190 nm-- 1200 nm 350 nm - 2400 nm
Numerical aperture (NA)	0.16 ± 0.02 0.22 ± 0.02 0.28 ± 0.02 customized upon request
Operating temperature	-190 °C to +350 °C
OH content	
Optran® UVNCC Optran® WFNCC	high (> 700 ppm) low (< 1 ppm) customized upon request

Simulating NCC fibers is highly complex: corner radii, core-to-cladding ratios, and geometry variations interact in ways that are difficult to predict.

At CeramOptec, our specialists ensure the right selection and validation of the optimal fiber design for your specific application.

sales@ceramoptec.com
www.ceramoptec.com

CeramOptec GmbH
Brühler Str. 30
53119 Bonn, Germany
+49 (0)228 97967-0

Ceram Optec SIA
Domes iela 1a
5316 Livani, Latvia
+371 (0)65343646

CeramOptec / biolitec
100 York Blvd., Suite 240
Richmond Hill, ON L4B 1J8,
Canada
+1 (0)437 914 9233

biolitec laser science and technology Shanghai Ltd.
Unit 302-3, Tower 1, No. 38
De Bao Road, Shanghai
China, 200131
+86 (0)21 6308 8856