Vision

“Through optical fiber- and laser technology, we deliver state-of-the-art commercial solutions in collaboration with our partners for the benefit of mankind”
How are we different?

• NKT Photonics at the forefront of switch to fiber lasers

• Unique and IP protected fiber platform (>350 patents and applications)

• We provide the main fiber engine for the majority of the ultrafast fiber laser market

• Market leader in supercontinuum white light lasers
Markets

Imaging & Metrology

Sensing & Energy

Material Processing

47% 41% 12%
Material Processing

**Industrial**
- Mobile, electronics, display
  - Market size EUR ~270m
  - CAGR ~14%

**Medical**
- LASIK, cataract
  - Market size EUR ~100m
  - CAGR ~30%

**Marking**
- Glass, metal, plastic
  - Market size EUR ~200m
  - CAGR ~7%
Photonic Crystal Fibers - Our Platform

- Nonlinear fibers
- Passive single-mode large mode area fibers
- Active double clad fibers
- Gain modules
- ROD fibers
- HC fibers
Fiber house

• 17 years of fiber experience
• All fibers made in-house
• Cutting-edge designs
• Full quality control
PCF TECHNOLOGY IN 1999
PCF TECHNOLOGY IN 2017
Gain fibers and aeroGAIN products
Photonic Crystal Fiber Amplifier Technology for pulsed fiber lasers
Example of double clad fiber (solid core)

- Double clad for pumping (multimode)
- Signal core (single mode)
- Airholes to tune signal waveguide
- Stress elements for birefringence
Gain fibers

PM980 /Hi1060
Aeff ~30μm²

DC-200/40-PZ-Yb
aeroGAIN-BASE

~700μm²

~175μm²

~700μm²

~1600μm²

~135/14-PM-Yb

~3500μm²

~3000μm²

aeroGAIN-ROD-PM55

aeroGAIN-ROD-PM85

DC-135/14-PM-Yb
aeroGAIN-BASE
Fiber amplifiers modules
aeroGAIN-BASE OEM modules

- High pulse energy
- Nanosecond, picosecond, femtosecond

v1.1

- High average power
- Rated @ 100 W pump → 75 W signal
- Watercooled
- High power solution for 1064 nm
  - 3 m fiber length

v1.2

- High average power
- Rated @ 100 W pump → 75 W signal
- Watercooled
- High power solution for 103x nm
  - 1.8 m fiber length

v1.3

- Medium average power
- Rated @ 40 W pump → 30 W signal
- No water cooling
- Medium power solution for 103x nm
  - 1.8 m fiber length
When peak power is beyond ~250 kW:
aeroGAIN-ROD
Gain modules for ultra-fast lasers
aeroGAIN-ROD fiber amplifier module

- Highest pulse energy
- Highest average power
- 55 or 85 µm core diameter, single mode
- Polarization maintaining
- Nanosecond, picosecond, femtosecond
- Rated @ ~ 170 W pump → 100 W signal
- Optimized for 1030 - 1040 nm
- No solution for 1064 nm
aeroPULSE
Ultrafast fiber lasers
High power picosecond fiber lasers

- Up to 40W Average Power
- Excellent Beam Pointing Stability
- Narrow Linewidth
- Compact & Rugged OEM Design
- Low Cost of Ownership
- All-Fiber Design, Industrial Reliability
- Maintenance Free 24/7 Operation
- System Monitoring via Remote Diagnostics
- No Warm-Up Time – Instant ON
HC fibers
Ultrafast fiber delivery
Hollowcore fibers for pulsed fiber delivery

10 µm Core

18 µm Core

30 µm Core
Hollowcore fibers for pulsed fiber delivery

30μm Core

$M^2 \sim 1.2$

30dB/km Loss

10cm Bend Diameter

Ultra-Low Dispersion <10ps/nm/km
Summary

NKT Photonics unique PCF technology is a scalable platform for increasing market demands and it enables new generation of ultrafast fiber lasers with high energy and high average power.