



# The right choice of fused silica material for high power laser applications



**QIOPTIQ GmbH Co. KG**

Industrial Optics and Systems/LMP

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19th June 2020



**EXCELITAS TECHNOLOGIES CONFIDENTIAL AND PROPRIETARY MATERIAL**

Matthias Koppitz; Excelitas/Qioptiq

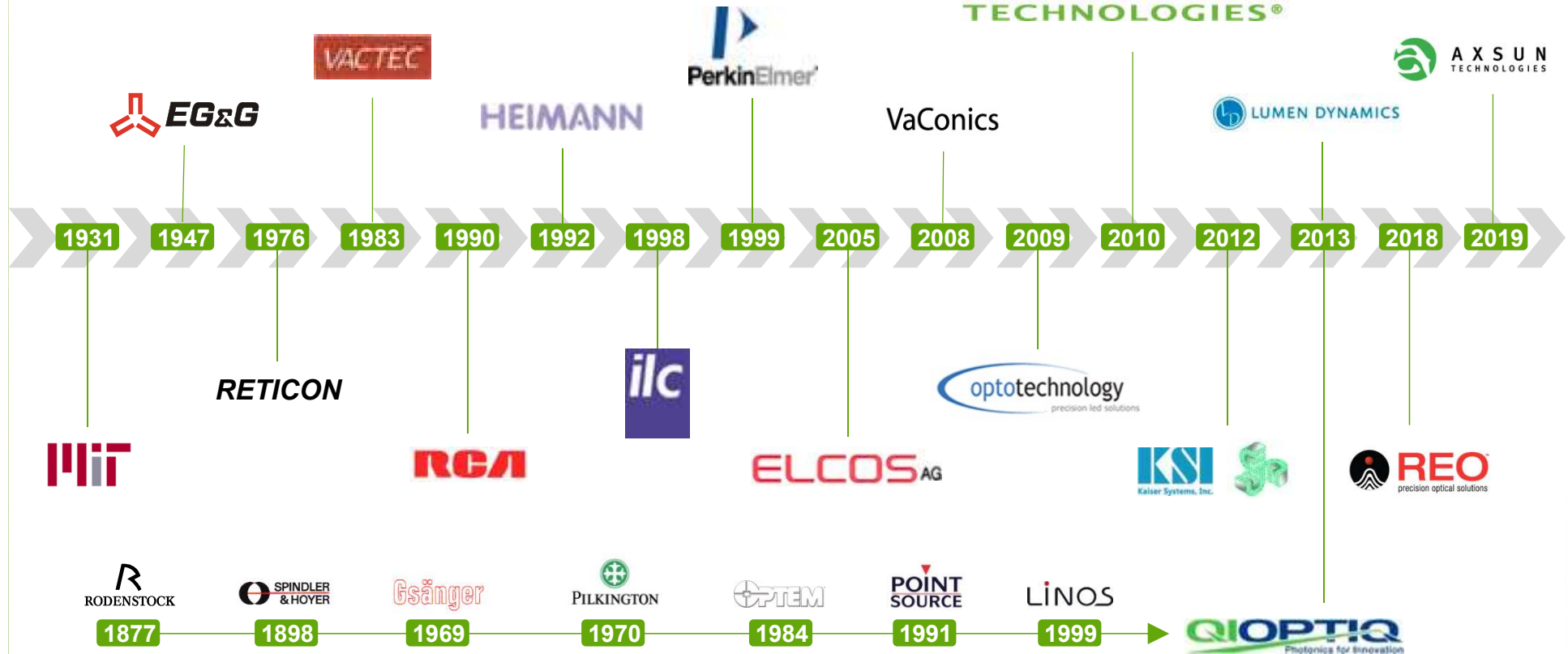
EPIC Online Technology meeting on Laser Beam Welding; Friday 19 June 2020

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# A Proud History of Innovation...



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...Spanning more than 135 years

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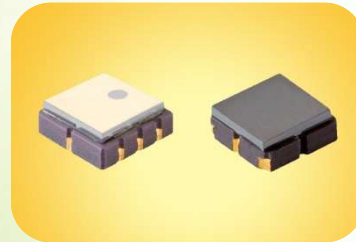
# End-to-End Photonics Solutions



## TECHNOLOGY PORTFOLIO

### • Emission / Illumination

- Lasers
- LEDs
- Plasma Discharge Lamps



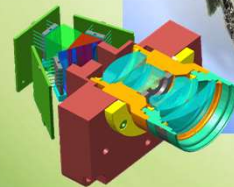
### • Optics / Transmission

- Fibre Optic delivery
- Optical Components
- Optomechanic assemblies



### • Sensing / Detection

- UV – Vis - IR
- High-Speed
- Low Light Level
- High-Volume



### • Electronics / Control

- Power generation
- Laser/LED/HIDL drivers
- Data gathering/post processing
- Integrated sensing circuits



## INTEGRATED SOLUTIONS

Design

Prototype

Build

- Discrete components
- Modules / Assemblies
- Photonic Subsystems
- Electronic control and data gathering
- Turnkey solutions

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# Motivation



## Why did we start the process of material qualification?

- Availability and raw material price trend
- Optimization of internal manufacturing processes
- Performance considerations
- Quality improvements for our customers
- Increasing High Power laser systems in the 24/7 industrial market

**“To bring the power and performance of a F1 car on the track, you need excellent tires”**



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# Procedure



## What have we reviewed and compared in the first steps?

- Different catalog values from all the manufacturers all over the world (Europe, USA, Japan, China,...)
- Delivery dimensions of raw materials and their tolerances
- Price and supply chain

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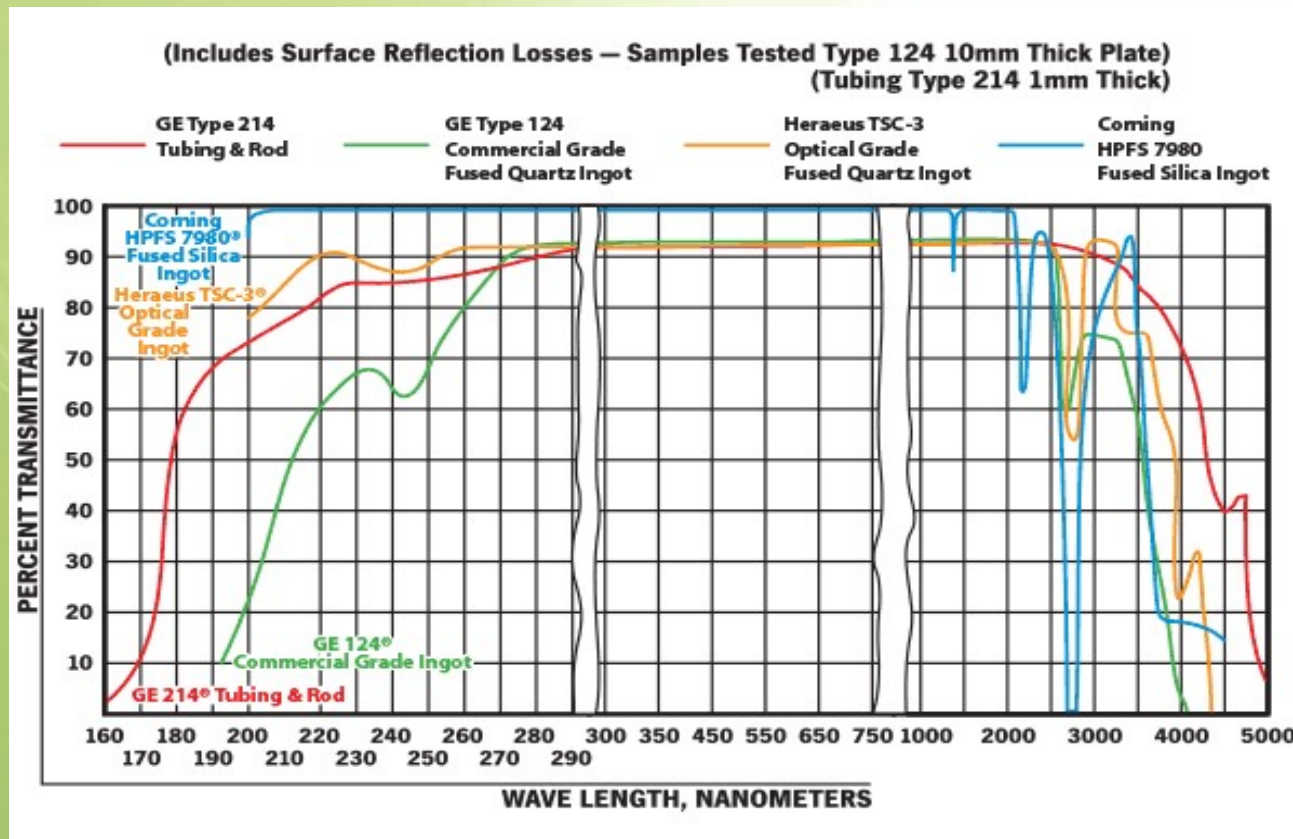


# Procedure



## What have we done from the design point of view?

- Transmission vs. Wavelength



Exemplify for different manufactures; Source: <https://www.technicalglass.com/>

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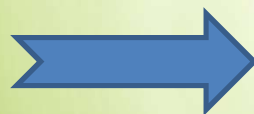
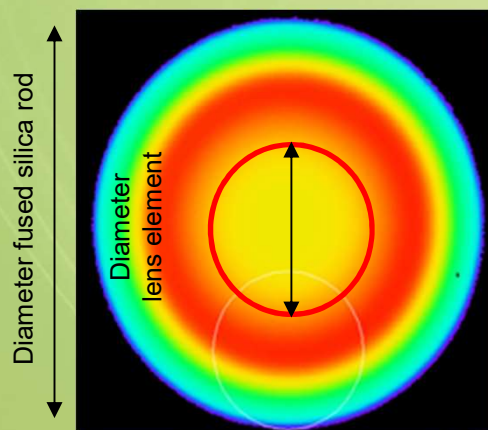


# Procedure

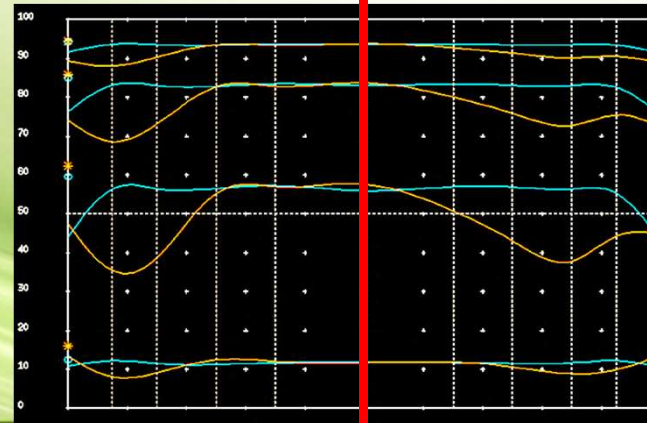
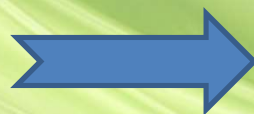
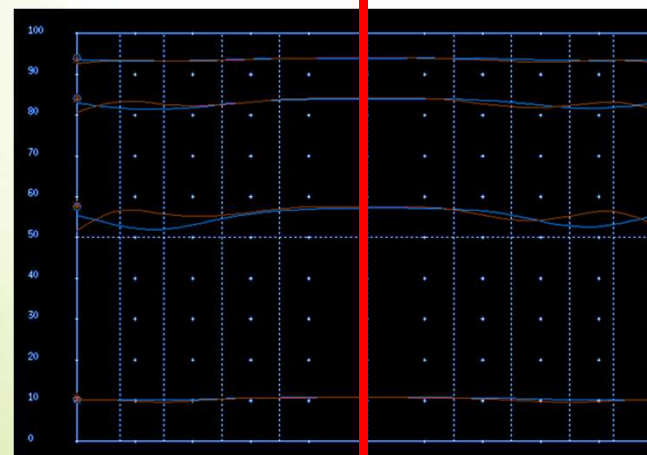
## What have we done from the design point of view?

- Homogeneity progression in the material

Homogeneity of fused silica raw material



optical spot quality over scan diagonal



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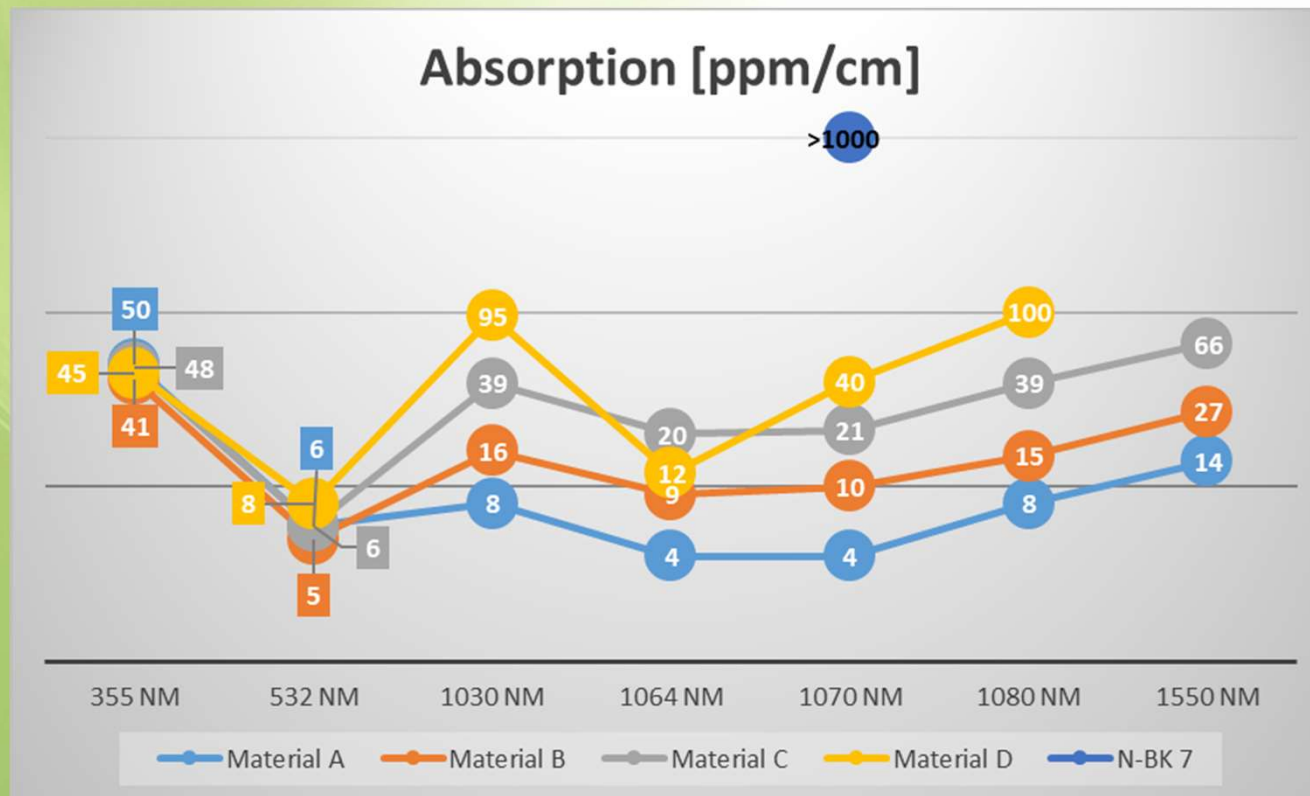


# Procedure



## What have we done from the design point of view?

- Comparison of own measurements and manufacture's data of the bulk material absorption (@355/532/1064nm)



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# Transfer

## How did we implement into Qioptiq standard products?

- Adaption of manufacturing processes
- Change of QM relevant working papers and parts lists
- Implementation of new fused silica material in 2019
- Price neutral
- Material supply chain secured



F-Theta Ronar 255mm / 515-540nm | F-Theta Ronar 118mm / 1030-1080nm | motorized Beam Expander 1-4x / 1030-1080nm | low outgassing Beam Expander 2-8x / 340-360nm

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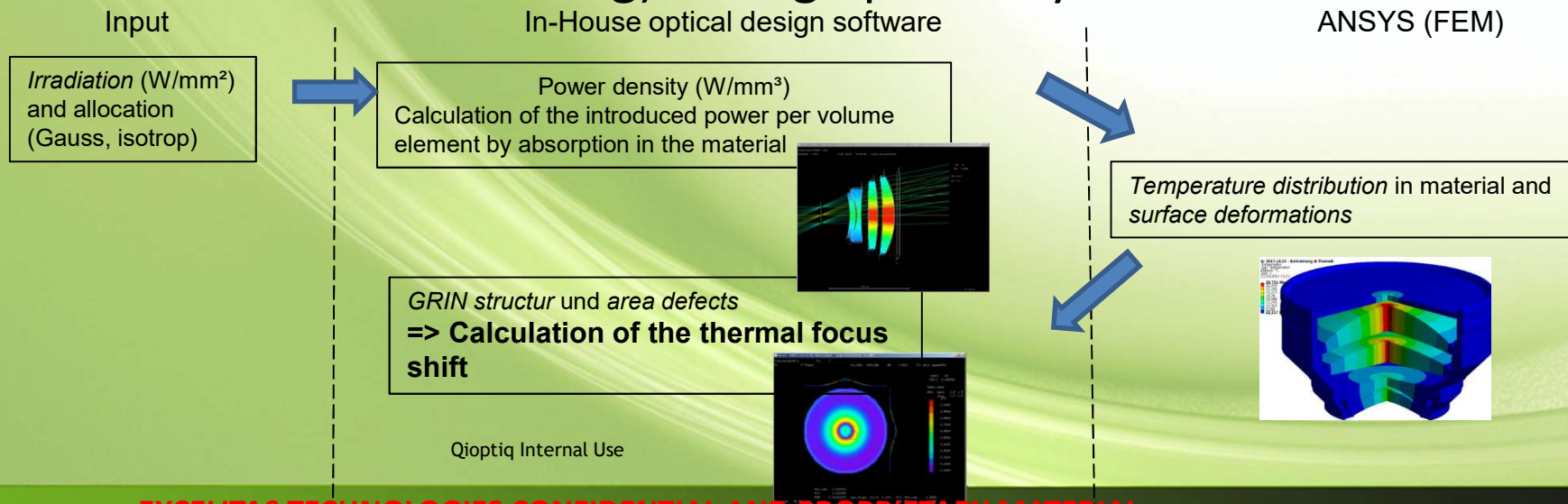
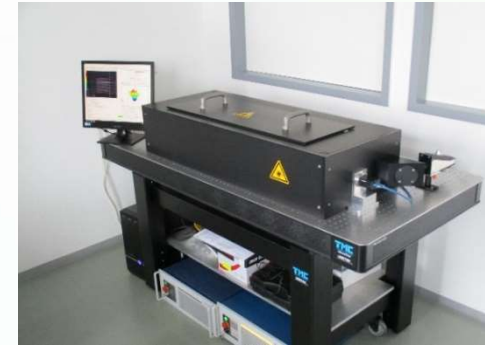


# Further „high power“ considerations @ Qioptiq



## What can we do for our customers as well?

- Low absorption coatings and serial monitoring of the absorption (@532nm and 1064nm)
- Simulation of thermal behavior (including material and coating) for high power systems



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## What can we do for you?

- **Optimized OEM developments**
- **Production of optical high power systems with our knowledge and expertise**
- **Delivery of free loan units**

## What can you do for us?

- **Qualification and test of our high-end optics in the application labs**
- **Input of new laser applications and trends to be in the pole position together with you!**



**Thank you!**