



How long is the fibre?

Testing method for the determination of the fibre length
in long fibre reinforced plastic parts

testXpo International Forum for Materials Testing 2016

Fibre reinforced plastics

successfully used in numerous industrial segments (automotive, aircraft etc.)

Fortifying a polymer with fibrous fillers

utilize the durability and stiffness of the fibre to improve quality of composite results in a significant increase of mechanical parameters (strength, stiffness etc.)

Matrix (polymer) is designated to surround the chopped strands in a force-fitting manner

Production process

injection molding

Fibre materials

glass, carbon, steel, nature

Matrix polymers

Polypropylen, Polyamid, Polyoxymethylen, Polyester

How long is the fibre?

Long fibre – short fibre reinforced thermoplastics

Short fibre reinforced materials

chopped fibres

granules, size app. 3 mm



orientation of fibres while filling of mold leads to anisotropy and warpage

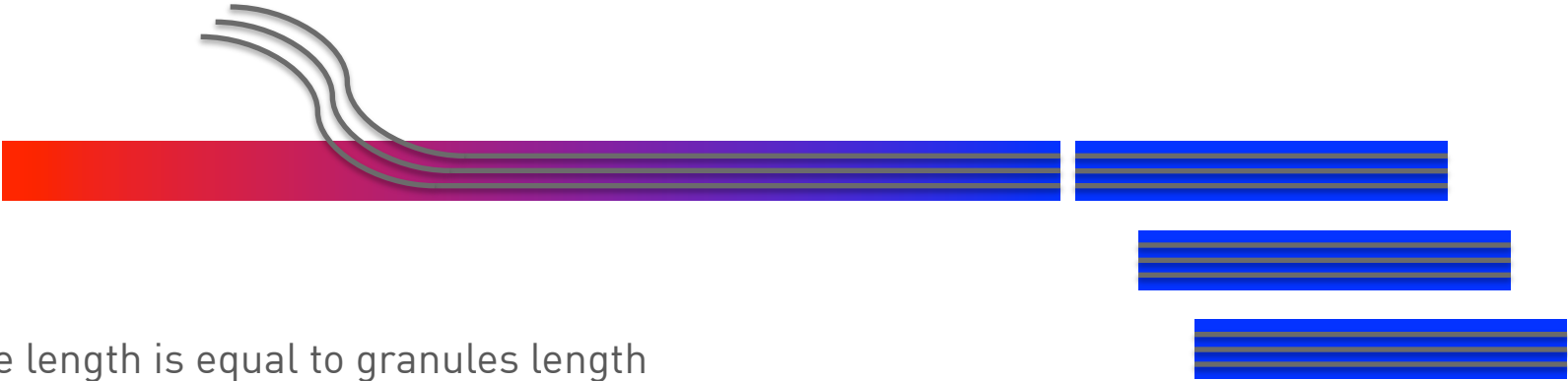
How long is the fibre?

Long fibre – short fibre reinforced thermoplastics

Long fibre reinforced materials

endless fibres

granules, size app. 10 mm



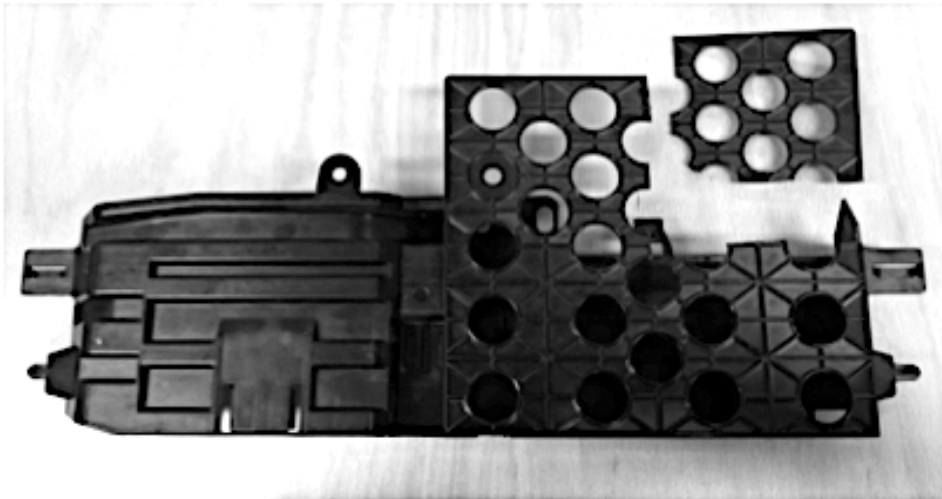
Fibre length is equal to granules length

How long is the fibre?

Long fibre – short fibre reinforced thermoplastics

Long fibre reinforced materials

less orientation while molding process, more like a grid



Seat bracket for German OEM



Part of seat bracket for German OEM after calcination

To utilize the high durability of a fibre

length in a molded part must exceed the „critical fibre length“
lower fibre length can lead to failure „pull out“

Fibres are excessively and repeatedly stressed during the process of part production

results in fibre breakage

Length of fibre in the part must be monitored

Testing method for the determination of the fibre length

ISO 22314 International Standard published 2006

prescribes

- Separation of fibres from the molded part
- Dispersion of the total amount of fibres to an amount to be analyzed
- Analysis of the fibre length and statistical report

polymerphys IK leads international project group for improving this standard

„Area Of Interest“

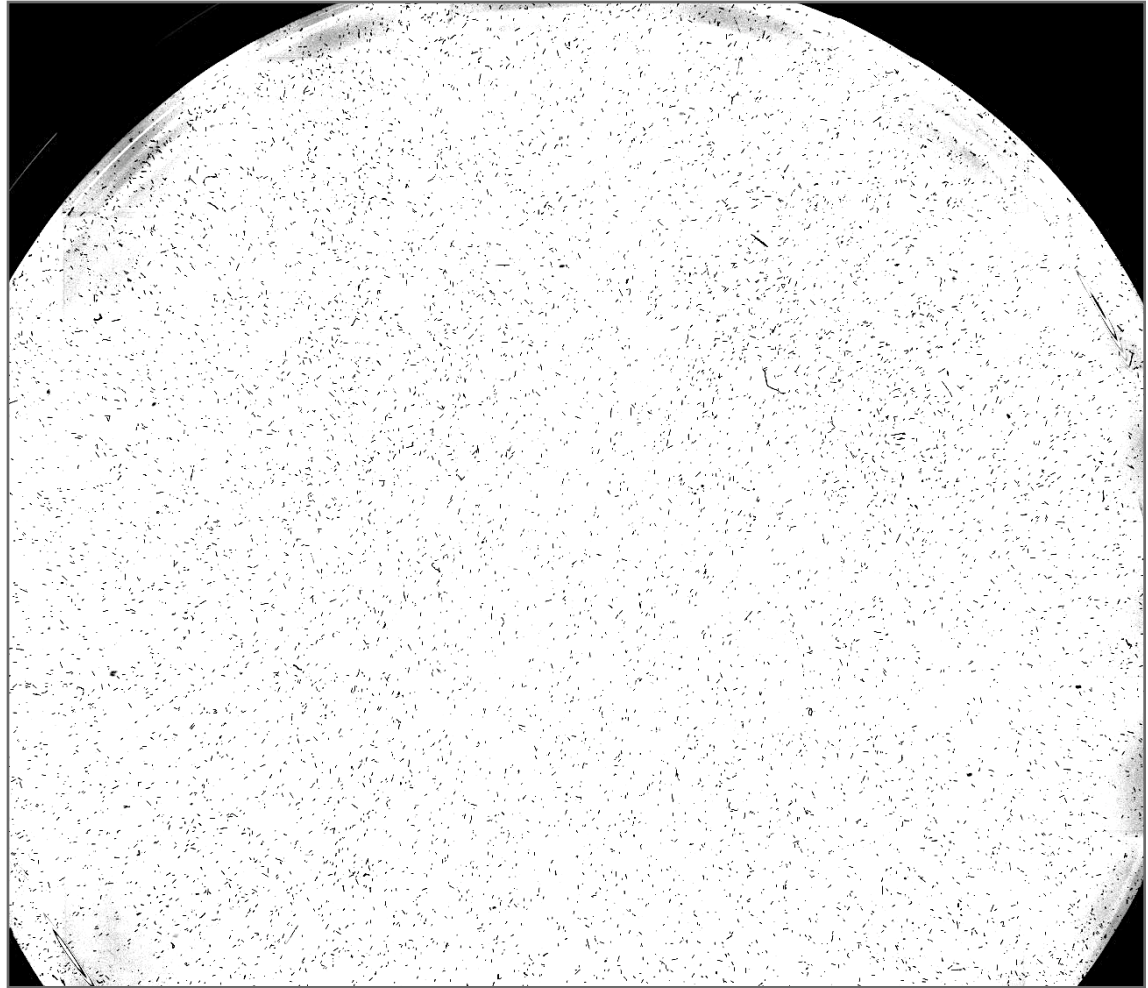
Separation of the „AOI“
from the molded part
without mechanical cutting



„AOI “ after calcination: undestroyed fibres in the boundary area

How long is the fibre?

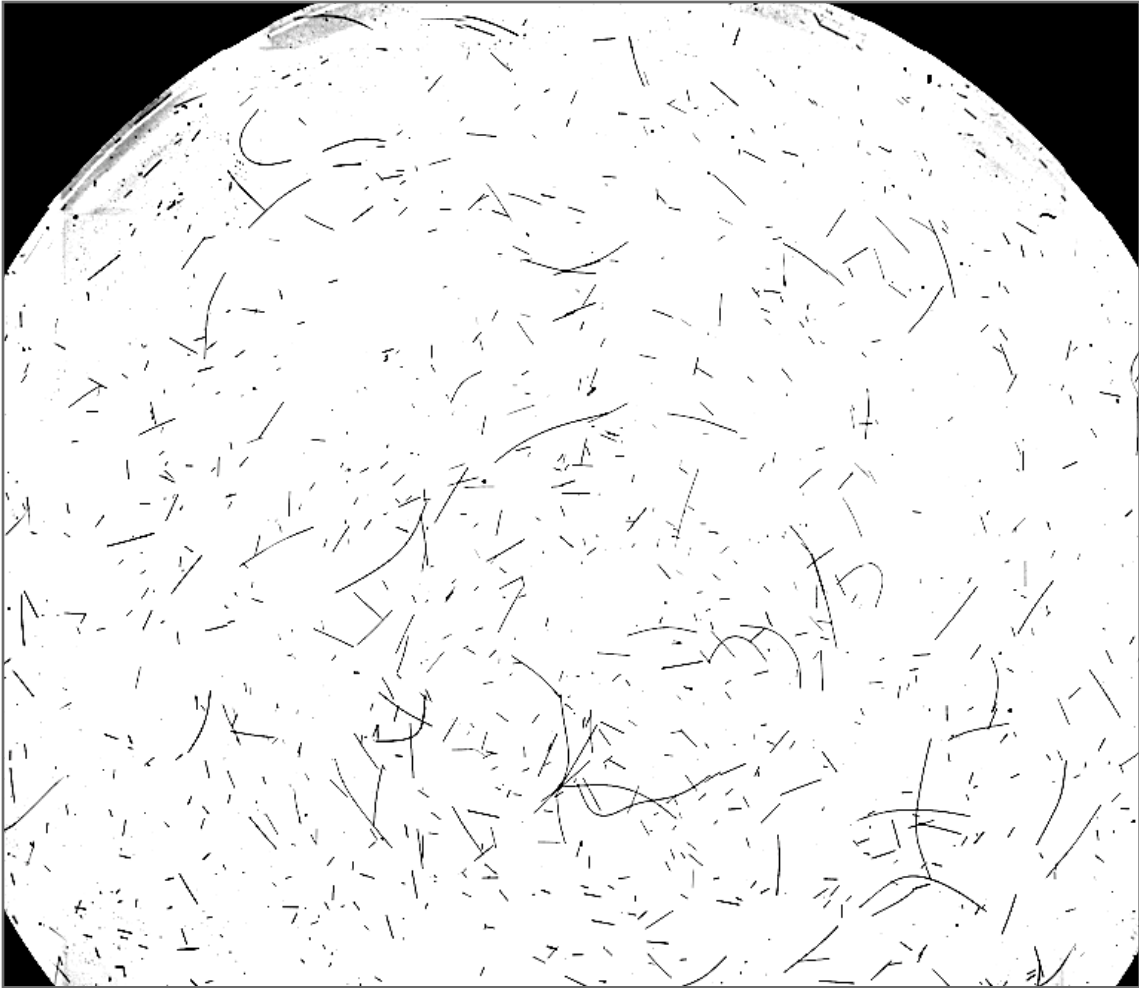
Photographic image
of short fibres



10 mm

How long is the fibre?

Photographic image
of long fibres



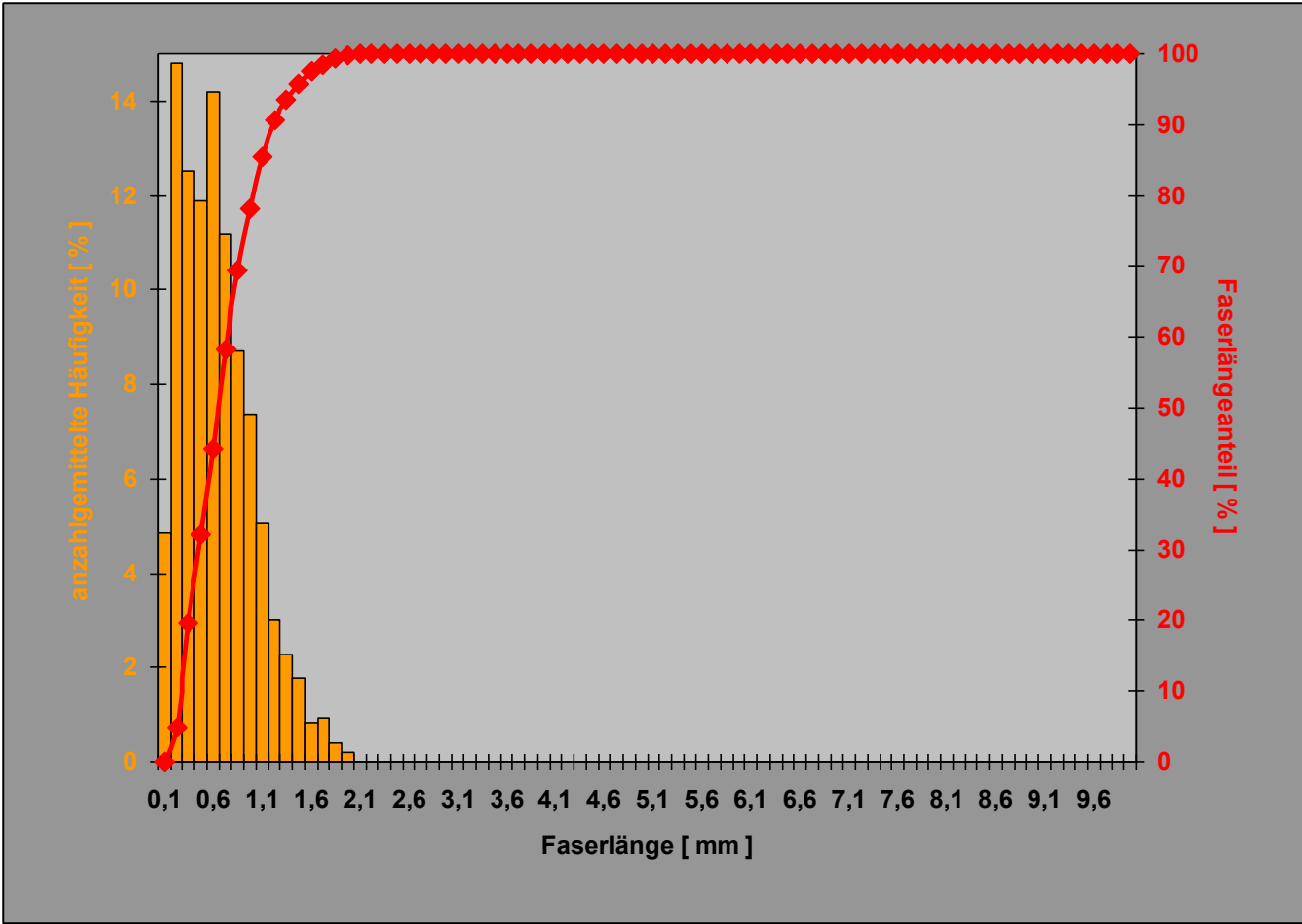
10 mm

How long is the fibre?

e.g.
Statistical Analysis
Short fibres

Mean fibre length

L_n 0,60 mm

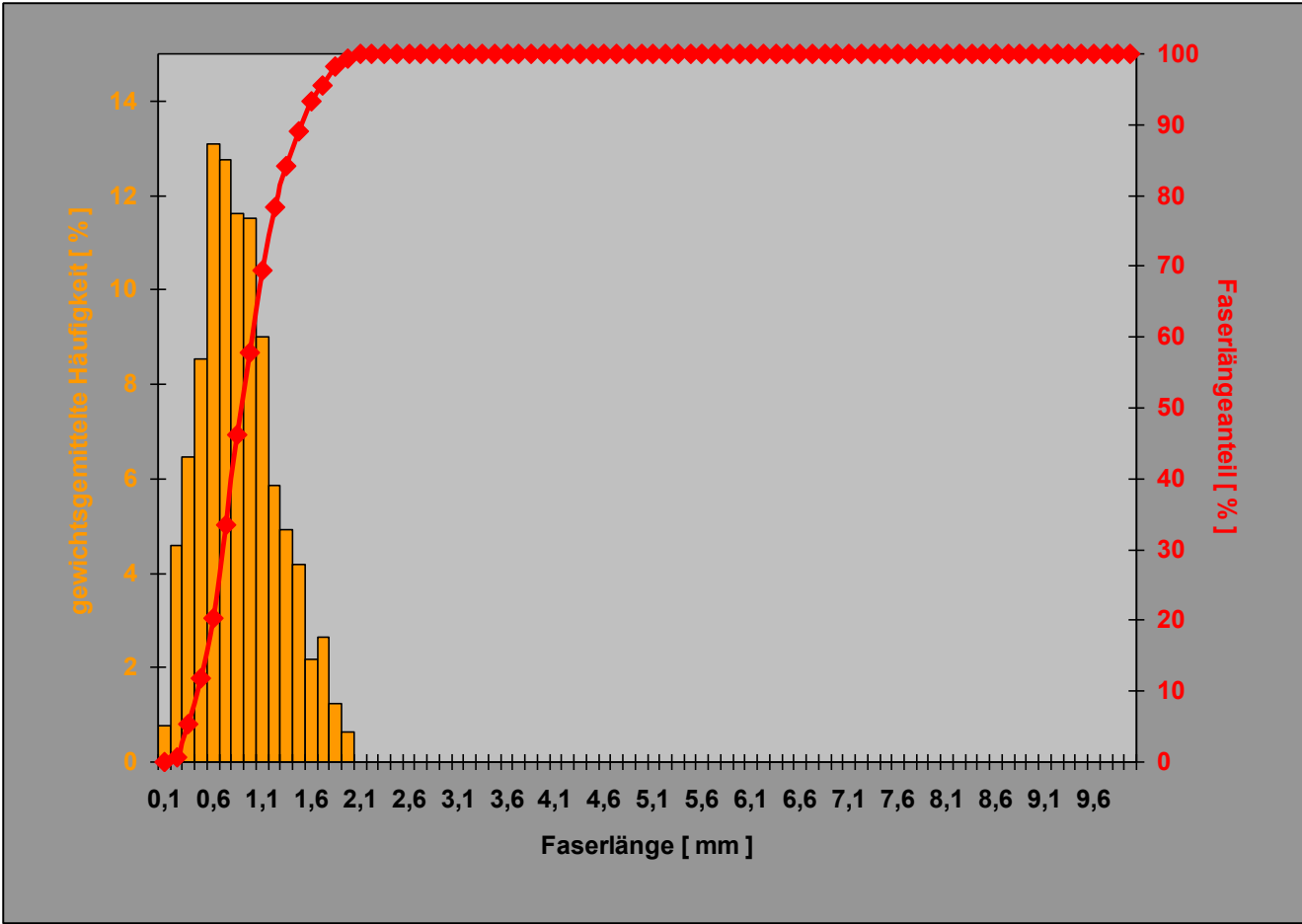


How long is the fibre?

e.g.
Statistical Analysis
Short fibres

Weighted
Mean fibre length

L_p 0,83 mm

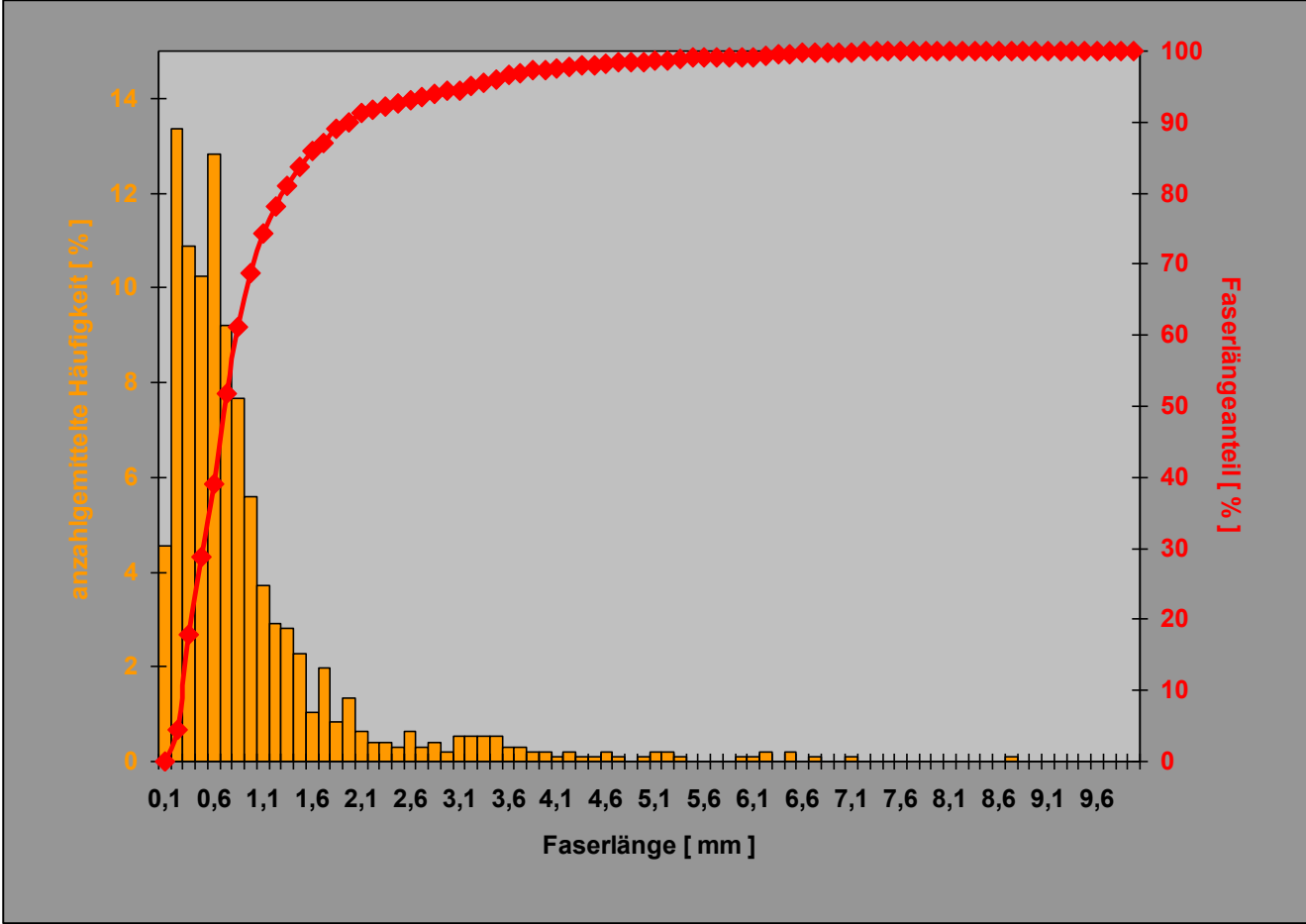


How long is the fibre?

e.g.
Statistical Analysis
Long fibres

Mean fibre length

 L_n 0,9 mm

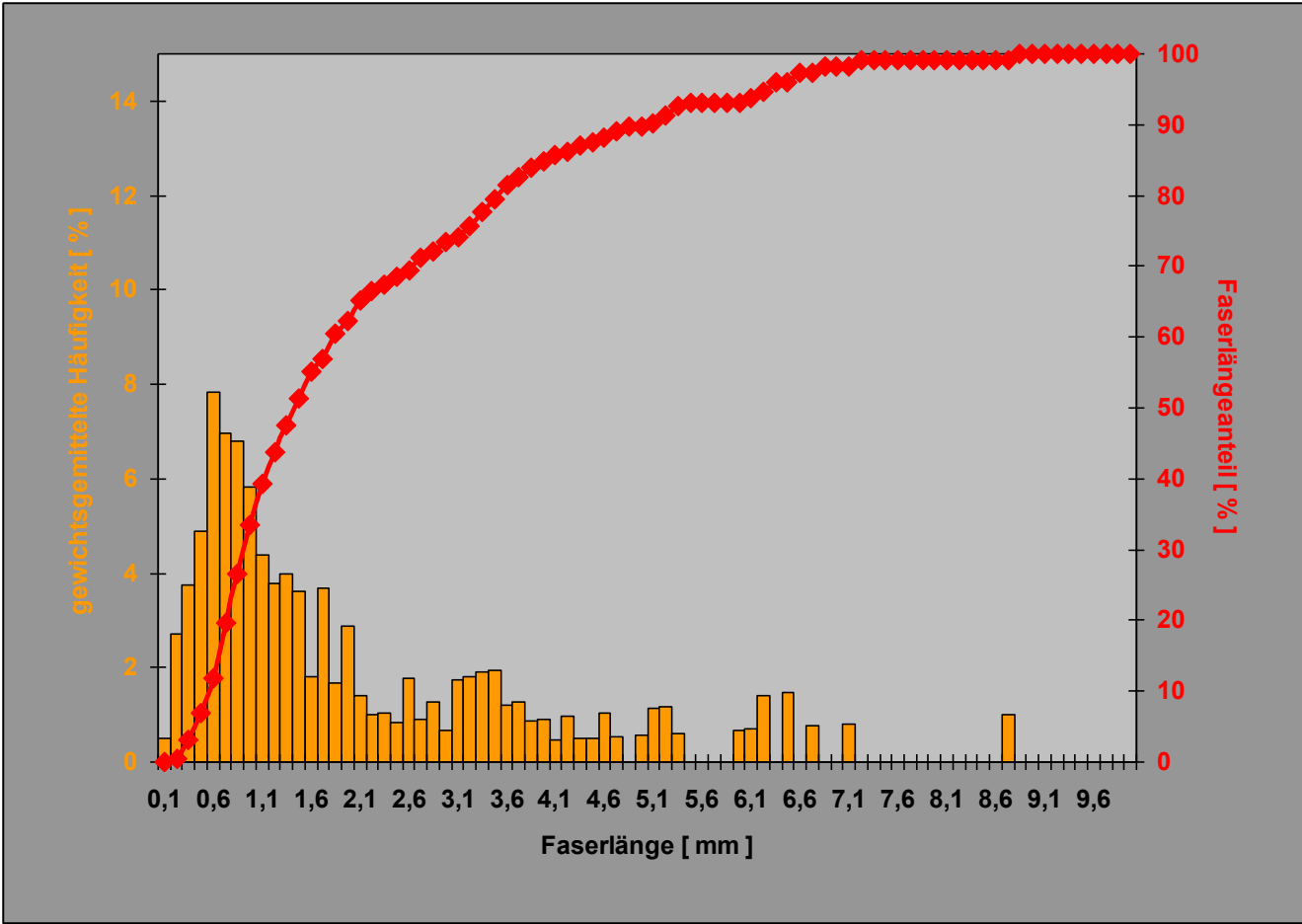


How long is the fibre?

e.g.
Statistical Analysis
Long fibres

Weighted Mean
fibre length

L_p 2,1 mm



Thank you

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