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X-RAY TOMOGRAPHIE OF STEEL  
FIBRE REINFORCED SHOTCRETE  
(SFRS)

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# X-RAY TOMOGRAPHIE

## Steel Fibre Reinforced Shotcrete (SFRS)



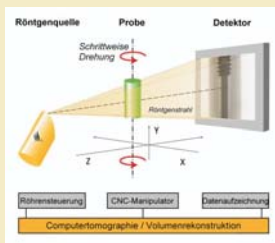
Sampling by core drilling in the Tunnel



SFRS drill core



X-Ray tomographie, ÖGI



Schematic diagram



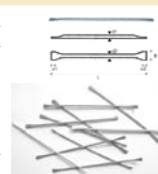
Voxel model



Steel fibre model

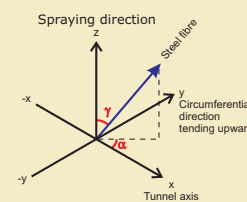
**Technical specifications:**

|                                |        |                        |           |
|--------------------------------|--------|------------------------|-----------|
| Diameter of steel wire         | d      | 0,65 mm                | ± 0,04 mm |
| Diameter of fibre              | d1     | > 0,5 mm               |           |
|                                | d2     | < 0,9 mm               |           |
| Length of fibre                | L      | 35 mm                  | ± 1,5 mm  |
| Width of flat end              | B      | > 1,3 mm               |           |
| Length of flat end             | e1, e2 | 1,5 mm                 |           |
| L / d - Ratio                  |        | 55                     | ± 5       |
| Tensile strength of steel wire | min.   | 1000 N/mm <sup>2</sup> |           |



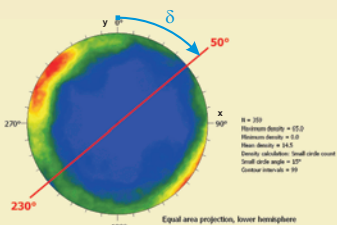
The composite material steel fibre reinforced shotcrete is applied widely in the geotechnics. The knowledge about the orientation of the steel fibres in the concrete is of decisive importance to model the mechanical behaviour.

The sampling and the X-ray tomographie at the ÖGI up to the statistical evaluation of the steel fibre orientation is illustrated.



$$\tan \alpha = \frac{y_z}{x_z} \quad \cos \gamma = \frac{z \cdot \vec{v}}{|\vec{v}| \cdot |z|}$$

### Orientation of the Steel Fibres, Mean value (87°) and Confidence interval



Schmidtt projection with density distribution of steel fibre density; low density at 50° and 230° (Stereo32)

