Materials and components properties are significantly influenced by an inherent or applied preferred orientation, or texture, which can be non-destructively investigated by X-ray diffraction methods.

DIFFRAC.TEXTURE is the powerful and easy-to-use software suite designed to analyze texture measurements. By utilizing a systematic approach to analysis according to a flowchart, DIFFRAC.TEXTURE delivers comprehensive texture information with just a few mouse-clicks.

DIFFRAC.TEXTURE features two well established and complementary techniques to provide the most accurate and reliable results: the model independent Spherical Harmonics methods and the model dependent Component Method. With the implementation of the latter in DIFFRAC.TEXTURE, all crystal systems are now supported and the variety of sample symmetries ensures that a huge diversity of textures can be handled.

- Component method for fully detailed model-based texture analysis.
- Spherical Harmonics method for direct computation of the Orientation Distribution Function.
- Straightforward creation of pole figures from 0D, 1D and 2D measurement data with single-click assignment to crystal phases.
- Powerful texture representation capabilities and extensive report generator.
DIFFRACT.TEXTURE is a comprehensive software suite for texture analysis of XRD data designed to support the user through the entire analysis workflow. From data processing to texture evaluation and result reporting – DIFFRACT.TEXTURE provides better results in shorter time.

1. Data Import and pole figure generation
The generation of pole figures from measured data has never been easier. DIFFRACT.TEXTURE can import data measured with 0D, 1D or 2D detectors and instantly create pole figures with single click operation either from selected angular regions (1D) or directly from 2D frame stacks via a single frame-cursor selection.

2. Linking texture model and pole figures
DIFFRACT.TEXTURE comes with a comprehensive crystal structure database that allows linking of pole figures to the corresponding hkl reflections with the least effort. Overlapping signals from different phases can be easily assigned to facilitate data analysis.

3. Pole figure analysis
DIFFRACT.TEXTURE features two complementary and powerful analysis methods that deliver accurate and reliable results:

- The model-independent Spherical Harmonics method directly calculates the Orientation Distribution Function (ODF) from pole figures with a single mouse-click.
- The Component method is a model-based approach that fits a set of texture components to the pole figures using fast and robust least-squares optimization.

With the ODF at hand and the ability to model the process symmetry of the texture components, DIFFRACT.TEXTURE provides a self-consistent and comprehensive picture of the texture right away – without being an expert.

4. Texture representation
DIFFRACT.TEXTURE includes powerful tools and options for a more detailed analysis of the obtained textures:

- ODFs can be computed and represented in 3D or as a set of 2D sections.
- Calculated pole figures from arbitrary hkl enable planning of further measurements to better understand your sample’s texture.
- Inverse pole figures along the surface normal, in-plane rolling and transverse directions.
- 3D visualization of the individual texture components to support a better understanding of their orientation.
- Pie-chart representation of the components’ volume fractions, including the isotropic content.
Simple or detailed analysis – DIFFRAC.TEXTURE has the solution
No matter whether you are interested in a rapid overview or in a detailed analysis of a sample’s texture: DIFFRAC.TEXTURE features two established analysis methods that meet your requirements:

Spherical Harmonics method
The Spherical Harmonics method is a model-free approach and the method of choice if the orientation distribution function is of primary interest. The ODF is directly calculated from a series expansion of the measured pole figures using a set of special functions defined on the surface of a sphere – the generalized spherical harmonics.

The advantage of the method is that it provides texture results in form of the ODF in a fast and simple way without requiring much prior sample knowledge.

Component method
The Component method is a model-based approach: The texture is modelled by a set of components that describe the orientation, crystal and process symmetry of a part of the sample [1]. From these texture components the corresponding pole figures are calculated. The parameters of the components are then refined by fitting the simulated pole figures against the measured ones using robust least-squares optimization.

The Component method provides a deeper insight into the texture: the process symmetry of a texture component links the manufacturing and processing of the sample to the measured pole figures.

The manufacturing and production process is of extreme importance for the texture of a sample. Depending on the type of sample and the expected sample symmetry either of the two analysis methods has advantages: The Spherical Harmonics method is the preferred choice for the description of soft textures as they are present in rolled metal sheets.

For samples with strong preferred orientations, a full description of the texture can already be achieved by using very few texture components. One important field is thin film research where pronounced textures occur and are used to enhance certain material properties. Here the Component method is the preferred analysis technique.

**Data import and pole figure generation**
- Import of 0D, 1D and 2D data files
- Pole figures are generated from 1D data or 2D data via a single cursor-selection operation
- Automated pole figure correction of background and defocusing
- Direct import of pole figures (.txt format)

**Material database**
- Comprehensive definition of crystal structures via all 230 space groups, lattice parameters and Wyckoff positions of individual atoms or ions
- Direct import of crystal structures from .cif and .str files

**Auto indexing**
- Single-click assignment of pole figures to texture phases
- Coincidences between different phases can be defined to support the texture analysis

**Spherical Harmonics method**
- Approximation of the Orientation Distribution Function (ODF) by a series expansion of generalized harmonic functions
- ODF from incomplete pole figures
- Harmonics series expansion a maximum rank of 34. The actual possible rank depends on the crystal symmetry and number of pole figures to analyze
- Positivity refinement option in addition for determination of the odd C-coefficients (‘ghost correction’)
- Available sample symmetries: orthorhombic, monoclinic, fiber and triclinic
- Crystal systems: cubic and hexagonal

**Component Method**
- Full support of all crystal systems
- Multiple-phase support combined with multiple components per phase enables flexible and comprehensive texture modelling of the sample
- Texture components can be of fiber or spherical type
- Available process symmetries: triclinic, monoclinic, orthorhombic, trigonal, tetragonal, hexagonal, axial, biaxial
- Definition of coincidences for assignment of pole figures to multi phases
- Non-linear least-squares fitting of pole figures with refinement of all or individual parameters of the texture components
- Single-click assignment of additional components for further improvement of the texture model
- Refined texture components can be stored to a database for later reuse and are instantly accessible via a drop-down list
- Calculation of the ODF from the texture components
- 3D visualization of the orientation of the individual texture components to support a better understanding of their orientation
- Pie-chart representation of the component content in the pole figures, including the amorphous content

**Texture result presentation**
- Recalculation of pole figures for arbitrary reflections
- 3D display of the ODF
- 2D display of slices of the ODF with constant Phi1, Phi or Phi2
- Calculation and display the inverse poles figure along the surface normal, in-plane rolling and transverse directions
- Calculation of Kearns factors

**Data exchange and reporting options**
- Creation of customizable, high quality analysis reports
- Data exchange options to and from any other Windows application: copy and paste, Windows bitmaps and metafiles
- Export of pole figures and ODF in .txt format

**Operating system**
- Windows 8, 8.1 and 10 (32-bit or 64-bit)