

## **Neutron diffraction measurements on a large size roller bearing ring**

In common with many engineering applications the introduction of compressive surface stresses plays an important role in the performance of roller bearings. Since the introduced stress profiles depend on the treatment method and the necessary balancing tensile stresses may have unexpected consequences, it is necessary to quantify the stresses throughout the bearing. This can be difficult in large bearings as the requirements of spatial resolution to resolve the high gradients near the surface and high penetration to measure in the bulk are usually mutually exclusive. As a result it is necessary to combine multiple, complementary methods to solve the problem.

In this paper we present an investigation into the residual stresses in a large bearing ring of 700 mm diameter. The bulk stresses were determined using neutron diffraction at the SALSA beam line at the Institute Laue-Langevin (ILL), Grenoble, France. Two different set-ups were used, conventional slits and oscillating collimators. Thereby information was gathered from the whole cross-section of the large ring. The surface stresses were measured using laboratory X-Rays combined with successive layer removal. X-ray diffraction was used to measure the residual stresses as well as the strain free lattice constant. Since the material has a hardness gradient, the strain free lattice constant was needed at a large number of positions in the bulk of the material.