Shearography has already established for NDT applications in the field of aerospace. Compared to thermography, which is commonly used in this area, the material-independent working shearography offers several advantages, such as for testing impact damage, delamination, crack, void, and undulation in composites. However, the major disadvantage of shearography is its susceptibility to failure in the presence of vibrations and environmental disturbances. In the OGKB laboratory of the University of Applied Sciences in Trier, the method is now being stabilized in a way that allows it to be used in raw industrial applications for the first time. The basis for this is the method of spatial phase shifting (SPS) according to the carrier frequency method, which, thanks to the further developed camera technology, firstly delivers representable results.

The implementation of this method is presented in the patented measuring device Interferoskop 5.1, which combines shearography with endoscopy for difficult to access areas. The Interferoskop consists of a housing, which contains the camera and the optical setup. The housing is designed for hand-held inspection and can be equipped with different endoscope tips. The laser illumination as well as the object monitoring is performed through the endoscope. The aim of this development project is to create a measuring device for the testing of turbines by spyholes, thus a high time and cost effort by disassembling the turbines can be avoided.

The implemented spatial phase shift method allows deformation measurements to be made in the video clock of the camera, which enormously increases process stability and at the same time permits dynamic component excitations. The Interferoskops performance for NDT is demonstrated by the inspection of defective turbine blades. Hereby, simply the cooling behaviour of the turbine blades can be used as active object excitation for the flaw check, while no additional excitation system is required. The new optical miniature design in 3D print construction enables maximum light efficiency and full shear-sensitivity adjustment while maintaining optimal result quality. In addition, the optical setup can be extended by a simple modification for holographic deformation measurement. Furthermore, first tests were made in hand-held operation of this micrometre accurate measuring method.

**KEYWORDS**

Shearography | Turbine blade inspection | Endoscopy | Interferoskop | Spatial phase shift |