

## **RESIDUAL STRESS MEASUREMENT OF COARSE CRYSTAL GRAIN IN TITANIUM CASTING ALLOY BY NEUTRON DIFFRACTION**

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Neutron stress measurement can detect strain and stress information in deep region because of large penetration ability of neutron beams. The present paper describes procedure and results in the residual stress measurement of titanium casting alloy by neutron diffraction. In this study, the three axial method using Hooke's equation was employed for neutron stress measurement. This method was applied to the two type samples of titanium casting alloy. One is a simple cylindrical shape. Another has relatively complicated shape of one which is nearly practical mechanical parts. From the results of this study, both of two samples have large crystal grain which was grown up during casting manufacture process. Furthermore, the peak profile used to the stress measurement appears in very weak because of the HCP crystal system of titanium character. These conditions usually make difficult to measure the accuracy values of residual stresses. Therefore, it had to spend a long time to measure the satisfied data from titanium sample, and oscillating operation was employed in this measurement. Regarding to the results of stress measurement, Residual stresses in the cylindrical sample change from the compressive state in the outer part to the tensile state in the inner part gradually. The other hand, residual stresses in the mechanical parts sample case had all compressive residual stresses in center position. It is seemed that these different between cylindrical sample and another one is effected from cooling history of manufacturing processes.

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