MLF Experimental Report	提出日 Date of Report 07/11/2013
課題番号 Project No. 2013A0020 実験課題名 Title of experiment Residual Stress Measurements of Ultrasonic Shot-peened Dissimilar Weld Joint at Elevated Temperatures 実験責任者名 Name of principal investigator Koichi Akita 所属 Affiliation JAEA	装置責任者 Name of responsible person Kazuya Aizawa 装置名 Name of Instrument/(BL No.) TAKUMI (BL19) 実施日 Date of Experiment 23, 24/05/2013

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。(適宜、図表添付のこと)
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

A dissimilar welded joint was prepared. The size of the joint was 100 x 100 x 10 mm^3 as shown in Fig. 1.The materials of the base plates were stainless steel SUS316L and nickel alloy NCF600, and the weld metal was nickel alloy YNiCr-3. The sample was treated by the ultrasonic shot peening (USP) after welding for introducing compressive residual stress in the surface layer.

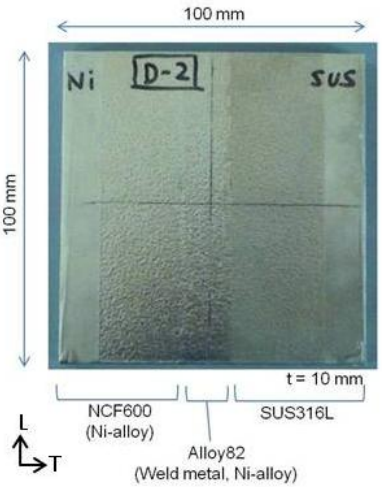

Fig. 1 Dissimilar welded joint.

2. 実験方法及び結果 (実験がうまくいかなかった場合、その理由を記述してください。)
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

The sample was heated from RT up to 593 K step by step using a jacket type heater that we developed, and strain measurements were performed using TAKUMI at the elevated temperatures. The experimental setup is shown in Fig. 2. The distributions of residual strain were measured by neutron diffraction at each temperature. The gage volume was 2 x 2 x 2 mm^3. Directions of the measured strains were L and N. Strain distributions were measured near the surface of the sample.

2. 実験方法及び結果（つづき） Experimental method and results (continued)

Fig. 2 Setup for experiment at TAKUMI.

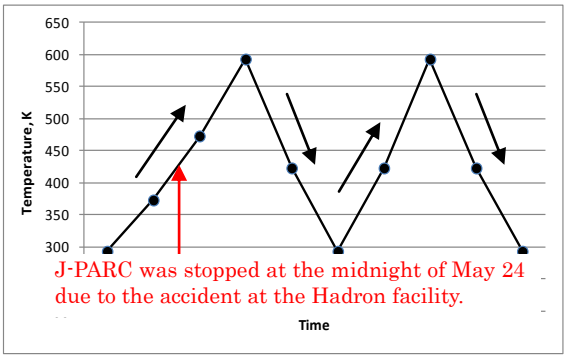

Fig. 3 Heating sequence. Plot marks in the figure indicate the strain measured temperature. The J-PARC beam was stopped in the mid-night of May 24.

In the 2012B round, we obtained the “tensile” residual stress behavior at the mid-thickness of the sample during cyclic thermal loading. In this 2013A round, we have planned to measure the “compressive” residual stress behavior near the surface. However, the accelerator of J-PARC was stopped at the second day of our machine time due to the accident at the Hadron Experimental facility. Therefore, the results were obtained only at the room temperature and 373 K in the first thermal cycle. The results were shown in Fig. 4. The compressive residual stresses slightly decreased with increasing temperature. The experiment should be continued in the next 2013B round.

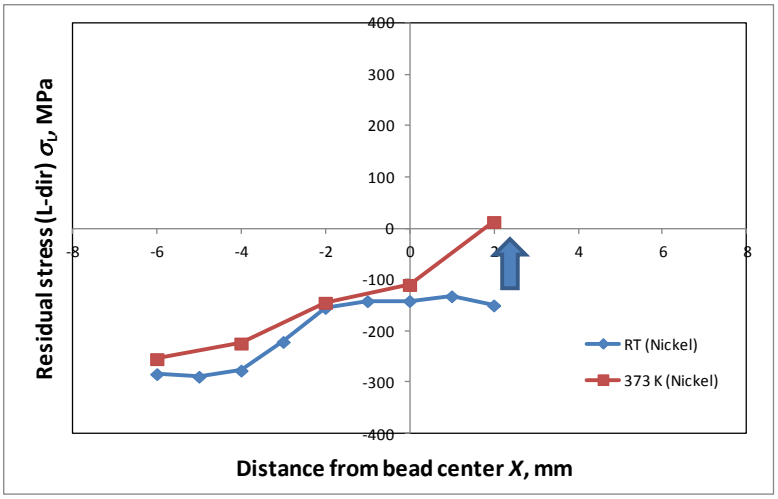

Fig. 4 Residual stress distributions in the nickel phase near the surface of the sample at RT and 373 K.