1. Introduction

Whole body ultra-magnetic field 14 T magnetic resonance imaging (MRI) magnet is now under design at Institute of Plasma Physics, Chinese Academy of Sciences, the main coil based on the preliminary design of Nb₃Sn Rutherford cable in Channel Conductor (RICC). Rutherford cable is a core components of the conductor. During the fabrication process of Rutherford cable, the strands were subject to server deformation, these deformation can result in significant reduction of the critical current and the Residual Resistivity Ratio (RRR). A Rutherford cabling machine has been purchased which consists of 20 spools, Turks head, caterpillar, and take-up facility. Rectangular cables without a stainless steel core were developed and four types of mixed cable using 1.0 mm Nb₃Sn strand and copper strand were fabricated. Two measurements method were adopt to evaluate the current critical degradation after cabling. The first one is to measure the critical current of the strands extracted from the cable, the second method is to measure the performance of the cable. In this paper, the results of measurements of critical current are presented.

2. Experiment

- Continuous pitch regulation with electronic synchronization of the main wheel and the caterpillar motion
- Single stage process: cable dimension given at Turk head
- Continuous measurement of cable size using a laser instrument
- Max speed: 3m/min
- Rectangular able without core

3. Results

Method 1

Method 1 is to measure the critical current of the strand extracted from the cable.

Method 2

Method 2 is to measure the critical current of the cable. The cable is bent onto the U-shaped mold.

4. Conclusions

Nb₃Sn Rutherford cable is core component for 14 T MRI. A Rutherford cabling machine was purchased and cabling technology was also mastered. Four mixed Nb₃Sn cables was fabricated by this machine. Two method was adopted to evaluate the performance of the cable. The result measured by first method show that the performance of the strand extracted from the cable have no degradation when the width of the cable is 5.5 mm and 5.7 mm, while the performance of the cable is lower than the expected value. Self field, thermal strain, cabling damage can cause the cable performance lower than expected value.