A Redundant Compressor System for the Helium Cryogenic Plant at TPS
National Synchrotron Radiation Research Center, Hsinchu 30076, Taiwan
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Abstract
Recommissioning the 700-W helium cryogenic system was completed in 2014 and it entered service in 2015. The main target of this system is a stable supply of liquid helium to the superconducting RF cavities at Taiwan Photo Source. The annual maintenance of the compressor of the plant causes operation of the system to be suspended at least two weeks. To avoid such a long suspension for the cryogenic plant, we installed a redundant compressor system for the cryogenic plant in 2015. We can switch to this redundant compressor system and restart the cryogenic system in a few minutes.

The Milestone

At NSRRC, the Taiwan Photon Source (TPS) project proposes to operate an electron accelerator with beam current 400 mA at 3 GeV. Two superconductive RF (SRF) cavities had been installed in the storage ring to maintain the eventual energy level of the electrons. One TPS helium cryogenic system provide the required cooling power for these SRF cavities. The cryogenic system was located in three areas, which was the compressor area, the gas helium buffer tanks area, and the cold box area. The helium cryogenic system was contracted to Linde Company in 2009, and arrived in 2011 July. The four 100 m³ helium buffer tanks were installed in 2010. The TPS helium cryogenic system was installed and commissioned by the supplier in the test area with non-vacuum jacked LN2 pipeline in 2012 November. The TPS storage ring structure was allowed for the installation in second quarter of 2013. The system was then disassembled, removed to the TPS storage ring, reassembled and commissioned by NSRRC staff in May of 2014. We had installed one redundant compressor system for cryogenic plant in 2015 to avoid the long shut down period for cryogenic plant.

The Redundant Compressor System

The layout of TPS helium cryogenic system

The configuration of the TPS cryogenic system

The change of the cryogenic control

The configuration of DC Bank

(A) Discharge valve opening (B) Compressor speed (C) High pressure (D) Low pressure (E) Bypass valve

Test of the DC-Bank supply