MAINTENANCE EXPERIENCE OF 315KW ELECTRICAL MOTORS OF HELIUM SCREW COMPRESSORS IN 1.3KW HELIUM REFRIGERATOR/LIQUEFIER PLANT

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- 1.3 kW at 4.5 K Cryogenic HRL (helium refrigeration/liquefier) plant at SST-1 IPR is consists three nos. of helium compressors.
- The Compressors are coupled with asynchronous induction motor rated for 315 kW/415V AC, 3 phase, 50Hz.
- Helium screw compressor and electrical motor plays a vital role for smooth and uninterrupted operation of the HRL system.
- Since 2003-2004, the SST-1 cryogenic system is continuously under operational where, Eight numbers of electrical motors failures noted.
- Different maintenance protocols for the helium screw compressor and motor have been updated and implemented.

- Various possible reasons of electrical motors failure:
  i. Ambient temperature condition and Operating condition
  ii. Misalignment of electrical motors with compressors
  iii. Motors and skid vibration, aging effect on motor winding
  iv. Higher winding temperature, overheating and bearing lubrication
  v. Motor Over heating, which cause:- Failure of the winding-isolation and Failure of the bearings.

- Preventive maintenance of electrical motors consists of following:
  i. Alignment of electrical motors with compressors
  ii. Electrical motors overhauling and rebuilding

- Motor Overhauling and rebuilding process consist following:
  i. Dismantling of electrical motors
  ii. Core preparation
  iii. Rotor balancing
  iv. New winding
  v. Final assembly and testing

- Improvement of motor cooling consist following:
  i. Motor cooling with water jacket on bearing
  ii. Developed dedicated Ethernet communication base software and supported hardware for measurement of online vibration and motor temperature.

- Electrical motors overhauling in periodic interval and motor re-building, increase operational availability and time saving solution.
- Rich experience gained in motor alignment, overhauling as well as rebuilding.
- Improvement in performance of overhauled motor by improving ambient temperature condition and cooling technique. Also, achieved reliability of compressor as well as motor for continuous and round the clock basis SST-1 operation.