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Rotating machinery for LHC Cryogenics: first analysis of reliability and origins of downtime

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The Large Hadron Collider (LHC) is cooled by eight independent helium cryogenic plants. Each cryogenic plant combines an 18kW at 4.5K refrigerator and a 2.4kW at 1.8K refrigeration unit totaling 64 oil lubricated screw compressors, 74 expansion turbines and 28 cold hydrodynamic compressors. Since the first cool-down of LHC in 2007, the large number of running hours and start-stop sequences accumulated allow to draw some tendency for reliability of such key components for present refrigeration technology. Statistics and origins of downtime will be presented, with possible typical failure rates.

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