

Application, development and future of helium compressor in large-scale cryogenic engineering

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Liquefaction or refrigeration cycle with helium as working medium was the main thermodynamic process in large-scale cryogenic engineering. In the process of realizing thermodynamic cycle, helium compressor and expander were two core moving parts, which play the roles of providing power and expanding refrigeration respectively. Helium compressor had experienced the evolution process of piston and screw in helium liquefaction technology. Oil-injection screw compressor skillfully used the sealing effect and atomization cooling effect of oil film to solve the technical problems caused by easy leakage of small molecular weight gas and high compression heat of helium gas respectively. In order to improve the compression efficiency of helium gas, the profile of screw rotor was continuously optimized according to different working conditions and developed into the latest asymmetric streamline. The new processing and manufacturing technology also played a great supporting role in the realization of the new rotor profiles. In order to cooperate with the application of oil injection screw compressor, oil-gas separation and ppb high-precision oil removal technology had also made progress. With the accumulation of running time, it was difficult to avoid the accumulation of oil in low-temperature components, which would lead to engineering accidents. In order to completely solve the ultimate problem of oil pollution, centrifugal compression technology based on magnetic bearing would also expected to become the future development trend.

Keywords: Helium; Compressor; Cryogenic engineering; Screw; Centrifugal compressor

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