

Vacuum Interrupters to Gain Traction in GIS Dominant Markets

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- The vacuum interrupter consists of a pair of contacts that are separable and enclosed in a vacuum tight envelope with pressure maintained at 10^{-6} bar.
- According to Power Technology Research, the Asia Pacific region dominates the global market of vacuum interrupters with a share of beyond 50% in 2021 followed by EMEA and Americas, respectively.
- The GIS (Gas Insulated Switchgear) dominant markets are expected to observe an increase in demand for SF₆ alternative technology and vacuum interrupter being one of the main alternative technologies may gain traction in future as well.

The vacuum interrupter consists of a pair of contacts that are separable and enclosed in vacuum tight envelope with pressure maintained at 10^{-6} bar. The envelope is made up of a ceramic material which has a metal end plate brazed at each end providing support to the parts inside. The vacuum interruption technology is used in the power industry for repetitive switching, motor inrush current interruption, fault protection, overcurrent protection and short-circuit protection.

The vacuum interrupters find their application in the legacy equipment for instance transformers and switchgears. The on-load tap changing power and distribution transformers utilize VI in the tap changers that are situated inside the transformers. Tap changers assist in changing the winding connections needed to provide desired voltage at the secondary winding. Switchgear units be it high voltage or low voltage units have vacuum interrupters as part of their

components. VI is also a part of loose components for instance circuit breakers, load break switches, reclosers and contactors.

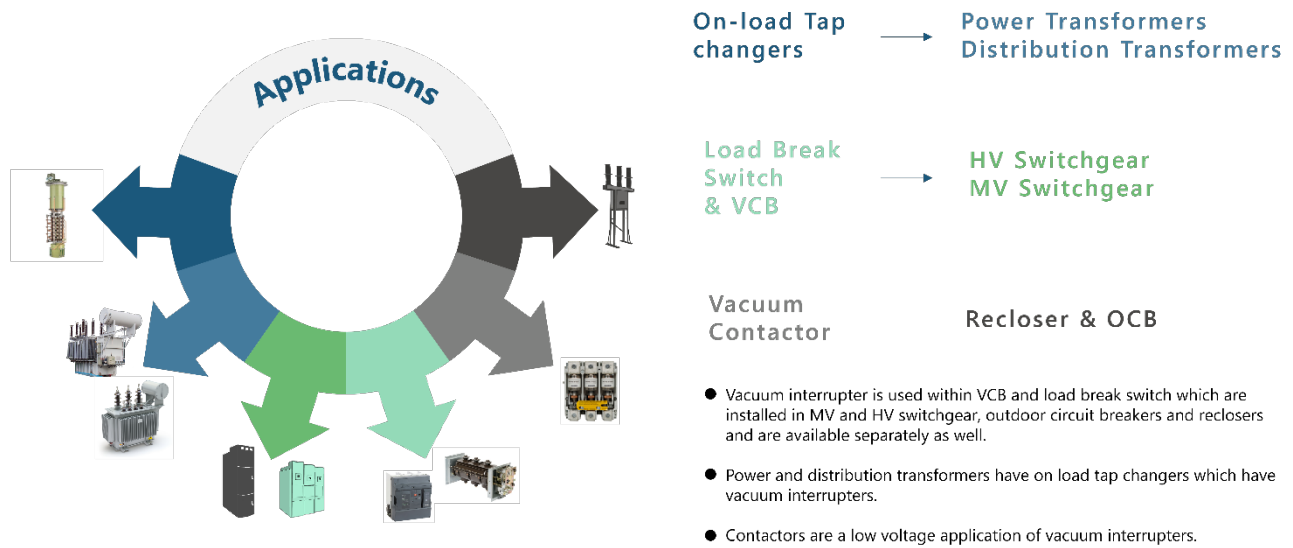


Figure 1: End Applications of Vacuum Interrupters.
Source: Power Technology Research

Overview of the Global Vacuum Interrupter Market

According to Power Technology Research, Asia Pacific region dominates the global market of vacuum interrupters with a share of beyond 50% in 2021 followed by EMEA and Americas, respectively. As far as the price of vacuum interrupters is concerned, in 2021 it observed an increase in price with the increase in price of commodities that are used in the manufacturing of VI like oxygen free high conductivity copper (OFHC), ceramics and steel etc.

Vacuum Interrupter Market – Revenue 2021

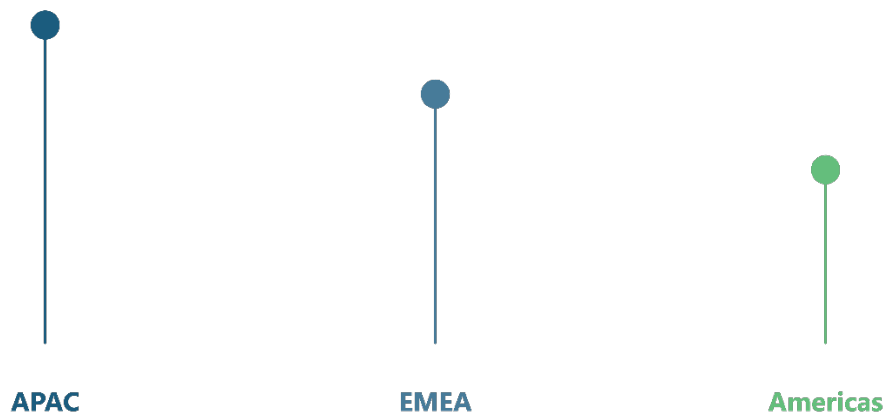


Figure 2: Market Share of Different Regions in Global Vacuum Interrupter Market (In Terms of Ranking).
Source: Power Technology Research

The global market of vacuum interrupters is driven by ongoing energy transition, network expansion plans and the trend of urbanization. Economies across the globe are moving towards deployment of renewables and increasing the efficiency of overall power systems. On the other hand, increased penetration of electric vehicles is pushing for growth in the electric vehicle charging infrastructure. This is resulting in a need for expansion and modernization of the power grid which in turn is instigating the demand for legacy grid equipment and components including the vacuum interrupters.

Furthermore, as the industrial base of countries are growing, they require modernization and expansion of their electric grid infrastructure that gives rise to the demand of legacy grid equipment. Growing population and the trend of urbanization is another major driver of the global VI market. Increase in the populations leads to increase in the demand of electricity which in turn requires upgradation of the T&D (transmission & distribution) infrastructure and ultimately gives rise to the demand of legacy grid equipment including vacuum interrupters.

Impact of Covid-19 and Russia-Ukraine Conflict

During the pandemic, economies across the globe experienced a slowdown mainly because of the lockdown that led to existing projects being halted, new projects postponed indefinitely, and industries being shut down. This negatively affected the demand for legacy grid equipment across the globe including transformers and switchgear. As vacuum interrupters are a key component for the legacy grid equipment, their demand dropped during the same period as well. However, majority of the demand has now recovered and reached pre-pandemic levels. Additionally, during the pandemic due to supply chain disruptions lead times for raw materials and finished products were at a record high.

We are observing a relapse of Covid-19 in China with other countries taking preventive measures in response. This along with the Russia Ukraine crisis has in turn led to supply chain disruptions which has resulted in an increased lead time for equipment, high transportation cost due to shortage of containers and spike in the fuel prices. Now the price of raw materials has increased all over the world which is expected to follow a continuous upward trend in the future as well.

Looking Ahead

Although vacuum interrupter technology is available for high voltage applications as well but mainly due to size constraints, SF₆ or other arc quenching technologies are being preferred globally in place of VI. Secondly, the cost of deploying HV (High Voltage) VI solution is high because the technology is currently at the initial stage of development. In a low voltage circuit breaker, using air or arc chute is enough to extinguish an arc while in the medium voltage range (1 kV to 42 kV) vacuum interrupter is used to extinguish an arc. Power Technology Research believes that as the policies are announced for the replacement of SF₆ in the electrical grid equipment especially in the EU (European Union), the GIS dominant markets are expected to observe an increase in demand for SF₆ alternative technology and vacuum interrupter being one of the main alternative technologies may gain traction in future as well.

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