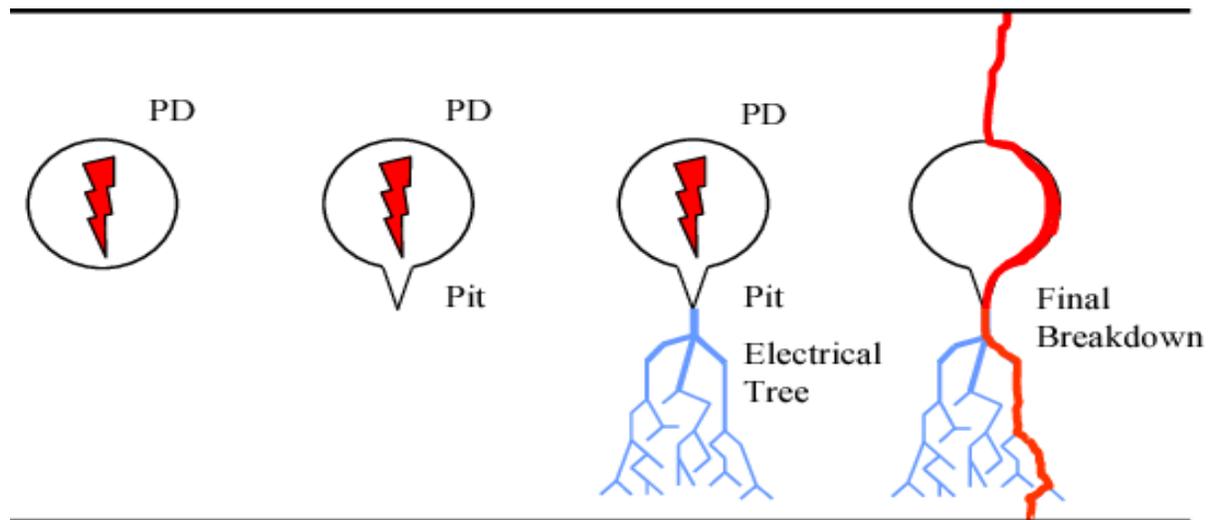


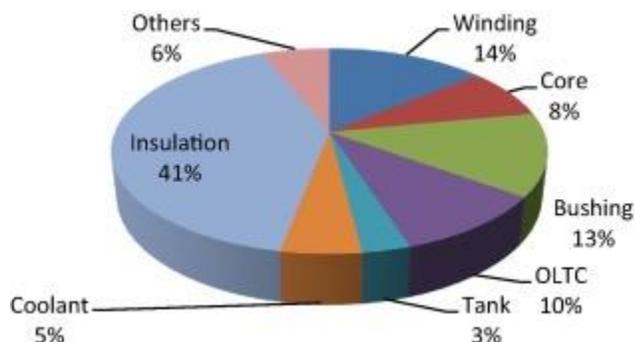
What is Partial Discharge and how does it occur?

Partial Discharge is a localized electrical discharge that occurs in a dielectric under High Voltage stress. Designing and manufacturing of the electrical equipment is a complex process and air pockets left in the solid or liquid insulation lead to the formation of partial discharges. These pockets of air or impurities have lower dielectric strength than the surrounding insulation and thus breakdown occurs more easily. When electrical stress increases, a small discharge current starts to flow in these voids. Progression of Partial Discharges over time leads to deterioration of the insulation and ultimately its failure. In solid insulation, partial discharges result in the formation of sparking channels that branch out and this process is called treeing. Partial discharges reduce the life span of the insulation significantly.

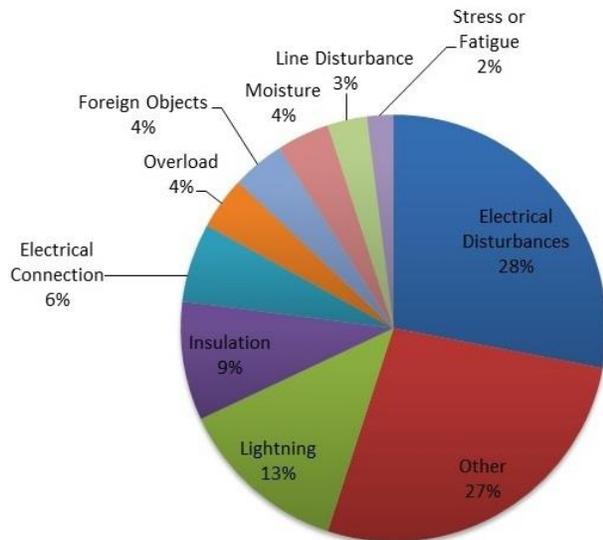


How is the transformer at risk? What are the consequences?

Medium and High Voltage transformers are at risk of insulation deterioration due to partial discharge. This significantly shortens the life span of the transformers. Insulation is a very important and integral part of a transformer, whether it is the overall solid insulation, inter-turn insulation, bushing insulation, disk insulation, or the tap changer. Any voids or cracks left in it during the manufacturing process can significantly impact the life span of the transformer. **Vast majority of insulation failure events start due to partial discharges.** According to a study performed in India, 41% of transformer failures are due to insulation failure.



According to another study performed in the USA, insulation deterioration and other causes such as PD are responsible for transformer failure 36 % of the time. As compared to other causes, this is a significant one. VTC and GTC have controlled these failures with design and manufacturing technology and process assurance.



TRANSFORMER FAILURE 1991-2010

What happens at VTC/ GTC ?

Virginia and Georgia Transformer Corporation has a team of highly technical experts, who carefully design and monitor the manufacturing and assembly process of the transformers. Special processes are maintained to limit the possibility of partial discharges, ensuring a longer life of the equipment. Special attention is given, not only to the design and material quality but also to the workmanship and plant environment. Particle count in all plants is at the level of the GTC plant that 'sets' the industry standard. All plants owned by the VTC / GTC have achieved less than 150 pC partial discharge reliability as compared to 500 pC allowed by ANSI/ IEEE. Partial discharge is measured in pC is pico-coulombs.

The core cutting machines are capable of cutting up to 37 In wide step lap core and the burr produced is typically less than 10 microns. A laser measurement system is used to measure the burr. Control of burrs is important as it can cause partial discharge if the tiny slivers of metal break loose in the oil. Partial discharge in liquids can occur due to the addition of impurities and these small threads of metal are impurities. VTC goes far beyond the routine industry standards and practices to make sure that its transformers provide the best value to their customers.

Low PD is only one of the qualities of VTC/GTC transformers to achieve 60 year life as designed and manufactured at VTC/GTC.

Partial Discharge Tests

Partial discharge tests are performed as per IEEE/IEC standards on all class II transformers. High voltage tests include the induced voltage test with partial discharge measurement. Tests include Partial discharge at 1.58x of Rated voltage for 1 hour with Corona detection.