

## Thermal hydraulic and structural analysis of Accelerator Cavity

A RF electron linear accelerator (LINAC) is used for radiation processing in different research and industrial applications. In RF LINAC cavity heat is generated in cavity because of loss in RF power due to surface current skin effect. Cooling water is continuously circulated through the annular jacket for removal of heat generated in the cavity. Inside the cavity, a temperature gradient establishes which causes deflection in the cavity. To operate cavity efficiently, the deformation should be minimum which can cause RF power frequency shift in the cavity. Thermal and structural analyses have been carried out to get the temperature distribution and local deflection in the cavity. The analyses have been carried out for existing LINAC cavity and with proposed cooling arrangement. It has been found that existing cavity can be operated at least with RF power loss of about 4 kW. With minor change in end flange inner diameter, the existing cavity can be operated even for higher power. Thermal and structural analyses have also been carried out with the design modification proposed for new cavity. Figure 1 shows the temperature distribution in the accelerator cavity. Figure 2 shows deflection in the cavity when operating at full power.

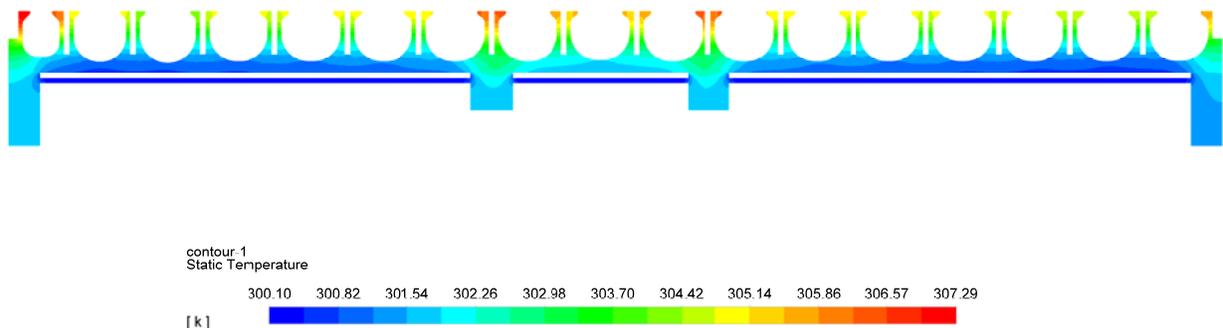


Figure 1: Temperature distribution in the accelerator cavity

### D: Static Structural

Total Deformation  
Type: Total Deformation  
Unit: m  
Time: 1

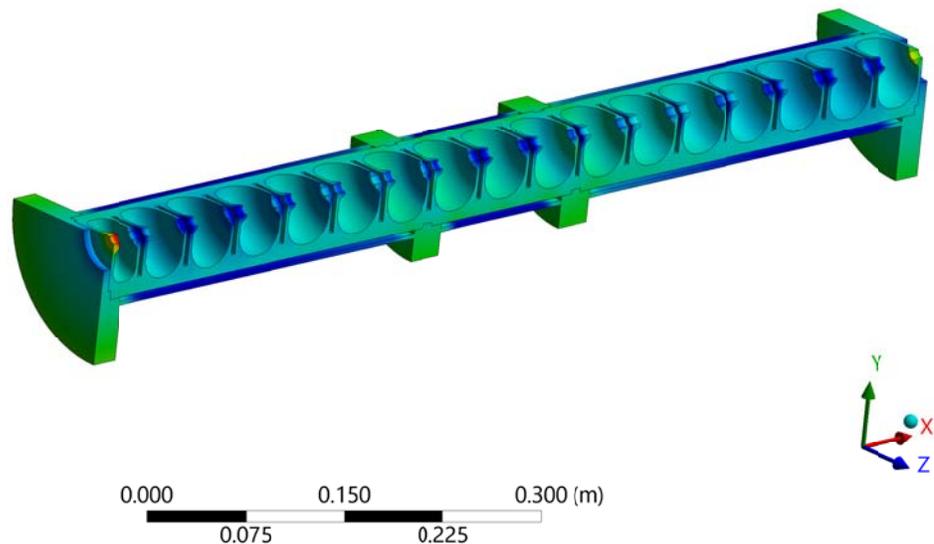
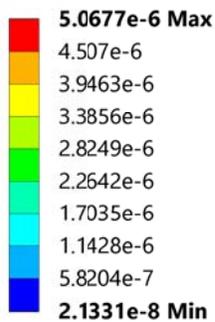


Figure 2: Deformation of the accelerator cavity in full power operation