

SECTOR:
CONSTRUCTION

OFFERINGS:
ENGINEERING SERVICES

TECHNOLOGY:
CFD

ESTIMATION OF HEAT FLUX FROM TRANSFORMER OIL POOL FIRE

Our customer is a North American HVAC consultancy firm. The firm was involved in an electric station project where many equipment and cabins were placed near to each other. One of the equipment was transformer that used oil for its cooling purposes. A possible fire in the transformer oil is hazardous to nearby equipment and cabins. If the incident heat flux from the fire is high, it can damage or cause equipment and cabins to malfunction. Owing to varying distance from heat source and relative orientation, it is not easy to analytically estimate the incident heat flux. CFD based study was desired for the estimation.

Zeus Numerix undertook the Transformer Fire Analysis using the Fire Dynamics Simulator (FDS) tool. The simulation setup was validated against NIST test cases and IEEE 979 guidelines. These represent the state of the art for such heat flux estimation simulations. The fire size was defined based on oil pool size and heat release rate of the oil. The simulation model accounted for all insulation walls in the electric station, that were meant as shielding for certain equipment.

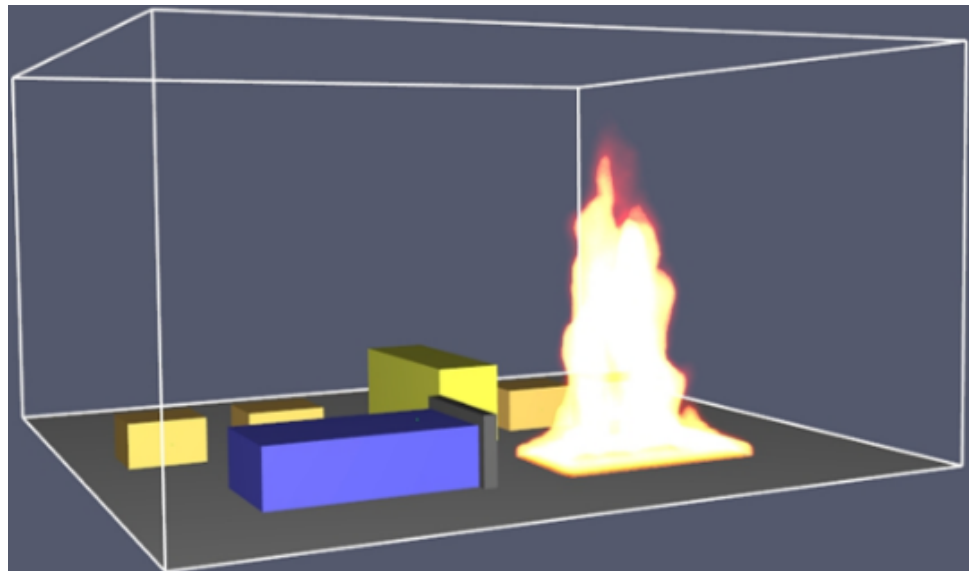


Figure 1: Transformer Fire Visualization

A comprehensive report containing the fire simulation was delivered to the customer. The report included the distribution of heat flux incident on the cabin walls. These included vertical walls as well as the roof. This gave the client the confidence to go ahead with the project.