

SECTOR:
HVAC ANALYSIS

OFFERINGS:
ENGINEERING SIMULATION
SERVICES

TECHNOLOGY:
FLUID DYNAMICS

PREDICTION OF TURBULENCE INDUCED BY AIR JET FROM PERFORATED TILES IN DATA CENTERS

Our customer is a premier North American HVAC consultant. They were involved in providing HVAC solutions to a data centre. The data centre AC cooling system used cool air jets ejected through perforated tiles on the floor. The customer designed a new set of tiles that was estimated to bring higher performance in cooling and reduce the power bill.

Zeus Numerix approached the problem by modelling and meshing the entire room with equipments using appropriate software. Tiles of standard and modified shapes were modelled. Experiments were performed on existing tile design. CFD simulations were performed for the existing design and the results were compared. Results gave good match in the trend of velocity variation in different parts of the data centre. Turbulence intensity and velocity of air impinging on the equipment were estimated. Once best practices for the simulation were established, CFD simulations were carried out for the new design.

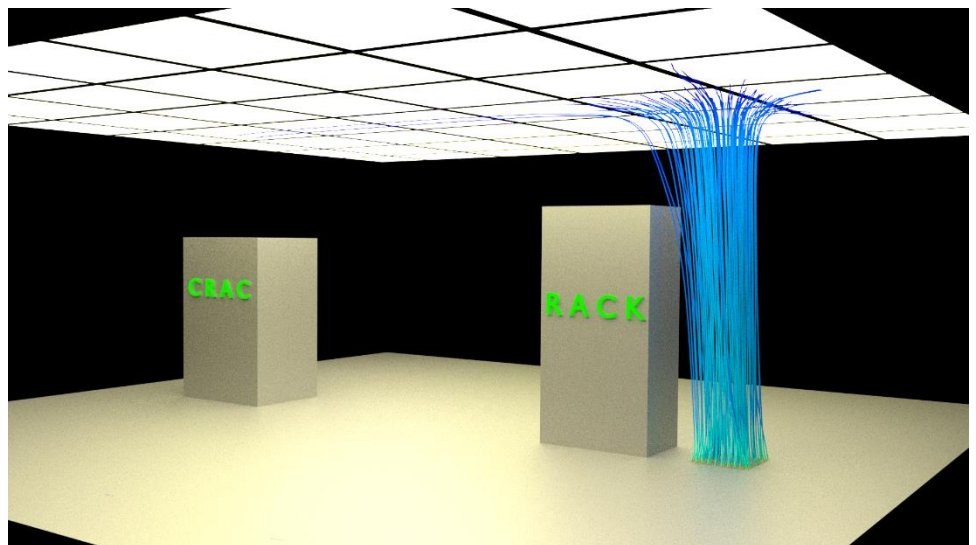


Figure 1: Screenshot of Air Jet Streamlines Animation

The customer was delivered with a comprehensive report on the comparison of CFD results. An animation of the entire simulation to visualize the impinging jet was developed and delivered to the customer. The results showed a 50% increase in the delivery of air flow to the server racks as compared to the original design. Insignificant increase in the pressure drop due to perforations in the tiles was observed. Once the CFD studies of the new design were complete, customer validated the result through an experimental study.