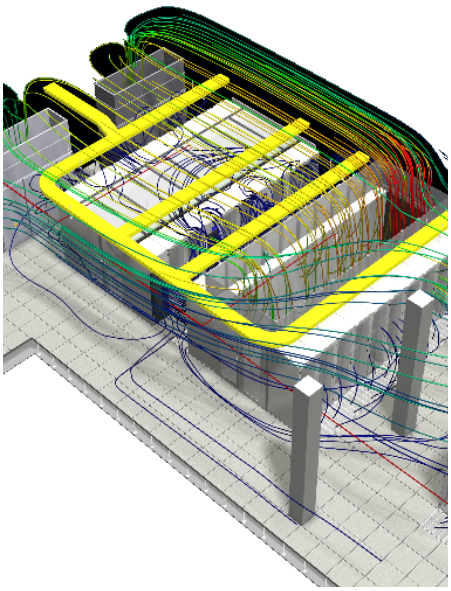
CRITICAL INFRASTRUCTURES

Case study

CFD Modelling

Location	UK
Size	94 cabinets
Return On Investment	90kW (immediate)



About

This global financial organisation, with headquarters based in London, provides financing and risk management services to a number of large companies, institutions and government clients.

With offices in almost 30 countries around the world and employing over 20,000 people, ensuring that all data centres are operating to their full potential is a key operational strategy.

The Brief

The organisation wanted to increase the amount of IT equipment within their data halls without additional mechanical plant.

Sudlows were appointed to look at two existing data halls, each with a floor area of over 1,500m^2 and containing over 300 racks.

The critical nature of the data centres necessitated a non-invasive approach that guaranteed zero downtime and minimised operational risk.

Through the use of Computational Fluid Dynamics (CFD) technology to assess the cooling airflow available an additional 90kW was unlocked within the data halls. This equated to 94 additional cabinets without the need for any additional supporting plant.

The Project

CFD Analysis

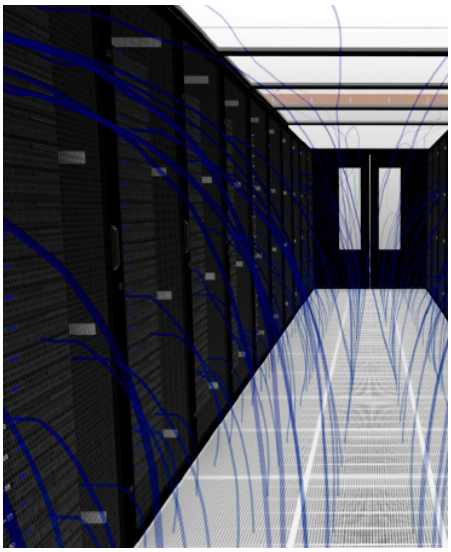
Using a bespoke CFD analysis, developed in-house with advanced data analysis and the latest in visualisation software, Sudlows were able to predict the amount of cooling that could be supplied to any proposed new cabinets.

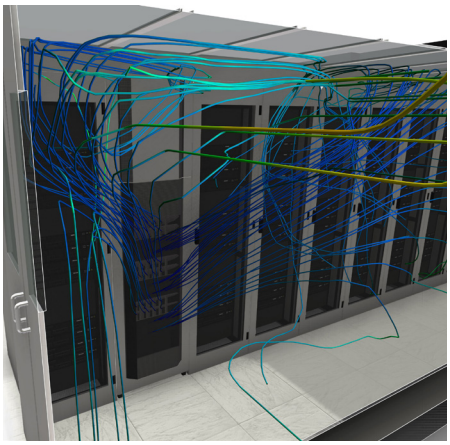
The impact that the addition of new cabinets would have on the current cold aisles was also assessed and quantified without any risk or alteration to the existing data hall.

A number of simulations were performed to assess the maximum power for each individual cabinet that could be supported by the cooling architecture during normal operation, as well as during failure scenarios where a number of CRAC units were inactive.

By utilising CFD analysis, the Sudlows Professional Services team essentially 'found' an extra 90kW of capacity which enabled the client to install an additional 94 cabinets without having to install any costly supporting plant.

The final assessment also proposed a method of energy saving through governing the CRAH units.





Rack Expansion

The proposed rack expansion involved utilising the floor space around the edges of the existing data halls and forming a number of small "Manhattan Skyline" style pods, each containing four to six cabinets.

In keeping with the existing data hall, these new aisles were also specified to be cold-aisle contained.

In addition to the "Manhattan Skyline" aisles, two further rows of cabinets were to be located towards the centre of the data halls, each to be fitted with air diffusers built into the cabinets, directing the cold air into the base of the cabinet before being distributed to the front of the servers.

This method of air delivery allows free standing cabinets to be located within the hot aisles. With a thin layer of plastic seperating the relatively small cold air stream from the hot aisle exhaust air, an investigation into the conduction of heat was necessary to ensure that this type of rack was suitable.

The additional 94 cabinets were to be chilled by the existing cooling architecture, without additional CRAC units or mechanical chillers. To evaluate whether this was possible, a full analysis of the current cooling configuration was required to ensure the existing capacity was adequate.

Conclusion

CFD analysis enabled the effect that each of the CRAH units had on the new aisles to be found, allowing the new regions to be effectively controlled by the existing control system.

This CFD analysis ensured that the new cabinets could be installed without risk to the existing data hall and with maximum capacities provided to the IT team. This enabled the data centre to be adequately cooled as it was populated.

"Computational Fluid Dynamics has been a highly regarded method of testing and analysing engineering divisions for a number of years.

"When this is applied to data centre modelling and auditing it provides impact on identifying efficiencies and making immediate cost savings."

Sam Wicks, Associate Director at Sudlows