

# IT Rack Selection Project

## Project Background

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A major UK based insurer was implementing a new 2,550m<sup>2</sup> (green field) construction datacentre, with average capacity of 1,500W/m<sup>2</sup> (power / cooling). Approximately 50% of cooling capacity was to be delivered by traditional Room Air Conditioning Units (RACU). The remaining capacity had to be delivered through alternate delivery method. Energy efficiency was a priority of the overall datacentre design. Other features that within the customer requirements included:

- automated door opening in the event of cooling failure
- swipe card / access control
- integration with building fire system

The datacentre was designed around an implementation of 96 x 24kW High Density (HD) IT racks operating at an average 75% capacity. A further 300 to 400 standard density IT racks (average 2.5kW/rack) were to be implemented within the IT hall, to locate network and SAN infrastructure, as well as servers with lower power / heat capacity requirements.



Mafi Mushkila was engaged to:

- develop and execute performance tests
- manage operational acceptance test process
- develop and manage procurement process
- manage initial and final manufacturer selection in conjunction with relevant customer departments
- manage detailed design of rack solutions
- coordinate rack design with other building services in the new datacentre
- coordinate installation of chilled water and power distribution services with mechanical and electrical contractor
- manage installation of racks
- manage design and procurement process for power distribution within IT racks
- manage installation of power distribution within IT racks
- coordinate High Density Rack testing with Integrated Systems Test (IST)
- manage snagging of solution
- Manage integration with Building Management System (BMS)

Mafi Mushkila conducted market research that resulted in five manufacturers of High Density IT racks being selected to participate in performance testing. The same manufacturers, with an additional two manufacturers were invited to participate in operational testing of standard density racks.

As part of the pre-selection process Mafi Mushkila conducted factory and customer site reference visits throughout Europe and the USA.

In conjunction with the Mechanical & Electrical Design Consultants (responsible for the overall datacentre design), Mafi Mushkila developed a performance test plan to test the High Density rack offerings.

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## Site Preparation

To minimise operational risk performance tests could not be completed within the customer's operational datacentres. A vacant warehouse was identified and procured within close proximity to client's operations centre in which a test facility could be constructed.

The site was previously used as a light industrial unit and was in some disrepair. The site was made weather tight, mains power restored, deep cleaned, painted, offices and washroom facilities replaced, security upgraded (grills, ram bars and alarm system), and the floor sealed.

### Raised Access Floor

To replicate the new datacentre, a 1-metre raised floor was constructed (including access ramps, steps and safety rails). For safety the floor was earthed to the building earth.



### Electrical Distribution

The site power lacked the capacity to run the chiller and IT rack loads, so a 500kW generator and splitter was installed within the service yard. The electrical distribution installed on the raised access floor and tested, with distribution to the IT rack positions.

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### Chilled Water

To deliver chilled water to the racks, a secondary chilled water main was installed, tested, flushed and treated (to prevent contamination and bacteria). A pressure relief valve was included for those rack solutions that required it. A 250kW water chiller and a primary chilled water main was installed within the service yard.

A Montair CMU (Heat exchanger) was installed between Primary and Secondary chilled water mains.



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## Test Methodology

A comprehensive series of tests were developed to demonstrate different aspects of performance of the High Density Racks:

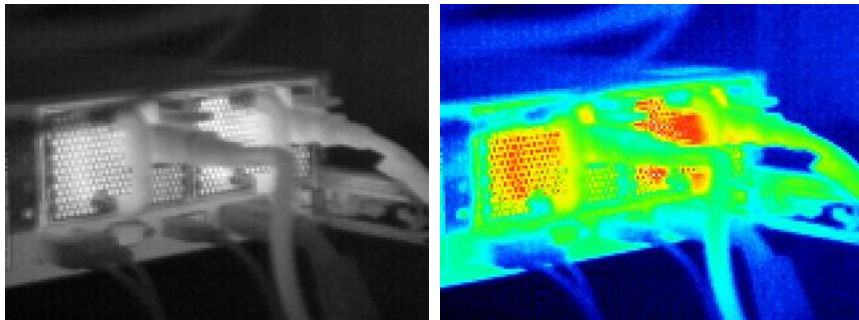
- performance during normal operation (25, 50, 75 & 100% loading)
- performance during failure
- resilience
- serviceability
- maintainability
- accessibility
- safety

Servers were simulated using heat load simulators as control rather than a full simulation of servers. Simulators provided variable heat load and air flow.

During testing temperature probes and a data logger were used to continuously monitor the temperatures throughout the rack (including server supply air stream).

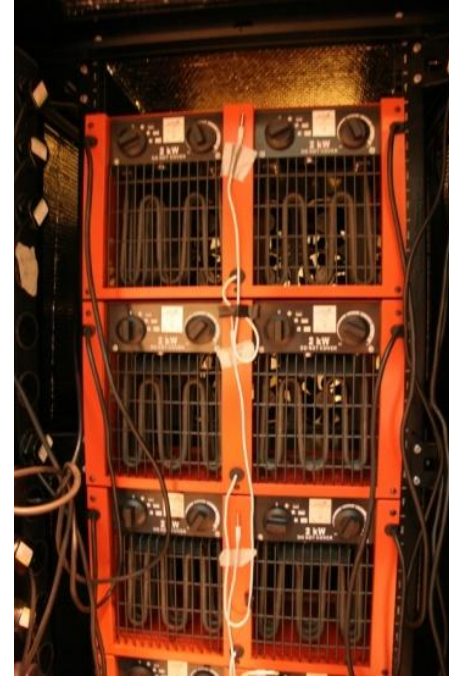
Thermal cameras were used to monitor radiant heat within and external to the racks.

Service processes were filmed and timed to provide a record of the process to determine the likely interruption to live service to facilitate routine maintenance or repair in the event of a failure.



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A questionnaire was developed by Mafi Mushkila to gather information from all operational teams as to the operational acceptance of the racks. Areas covered included access, ease of server installation / removal.

The results from the performance and operations acceptance test were combined with a summary from the factory and customer reference visits in a detailed report as well as an executive summary which were supplied to the client to aide selection.

In conjunction with the customer's procurement team, Mafi Mushkila managed the product selection and tendering process through to the successful engagement of the High Density Rack supplier; supervising the final solution design and implementation on behalf of the customer.