

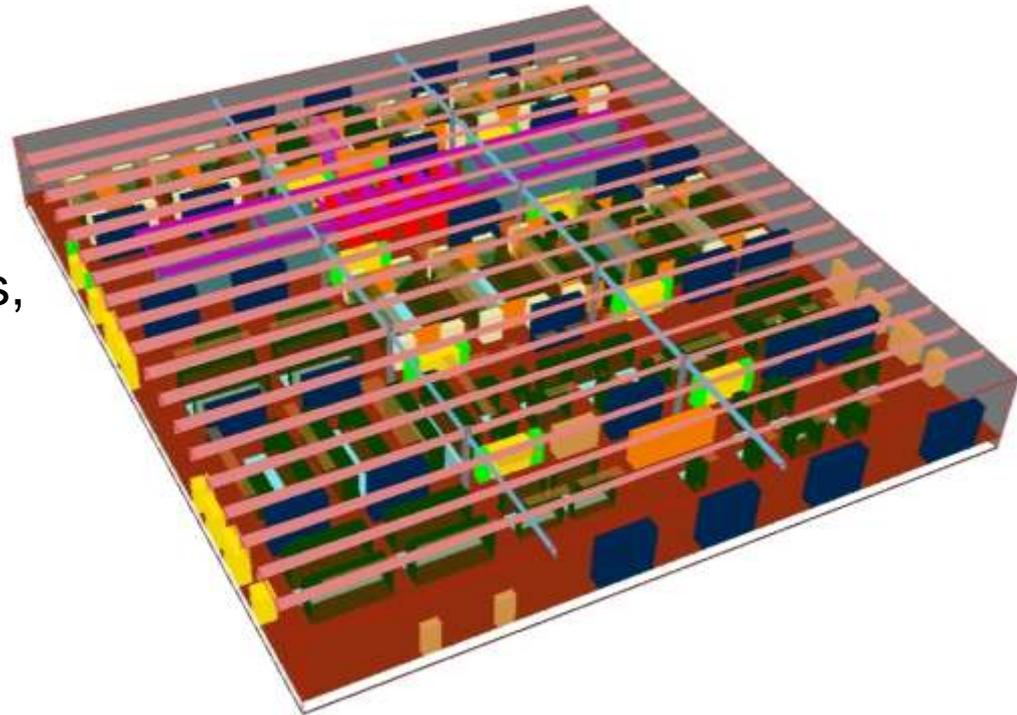


Data Centre Simulation

Seminar

CFD analysis performs a vital role within data centre design, management and operational processes.

CFD helps maximise the performance of cooling and ventilation systems, model the impact of additional loading and equipment distribution, and investigate emergency shut-down scenarios.



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A streamlined method has been developed at CHAM that constructs a list of data centre contents together with their key parameters (e.g. layout of all cabinets, dimensions, air flow rates, heat output, orientation and other parameters for each one) within a single spreadsheet.





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The spreadsheet is read by PHOENICS, enabling common data centre objects (i.e. CRACs, cabinets, floor / ceiling grilles) to be constructed automatically.

This method allows rapid changes to be affected, such as scaling IT loads by changing a single value in the spreadsheet.

Height off Floor (m)			Scale=		0.0254							
Zoff (m)	0.5001											
Zoff (m)	0											
No of cabinets	43											
Cab No	Width m	Depth m	Height m	Xpos m	Ypos m	Zpos m	FlowRate m3/s	Heat Output W	Heat Load Zpos	Heat Load Height	Orientation NSEW	
1	0.75	0.07	2.1336	2.77	4.2672	0	1.74719622	20720	0	2.1336	E	
2	0.75	0.07	2.1336	4.869	4.27	0	1.74719622	20720	0	2.1336	E	
3	0.01	0.07	2.1336	7.04	4.86	0	0.10819576	1295	0	2.1336	E	
4	0.01	0.07	2.1336	7.04	6.10	0	0.10819576	1295	0	2.1336	E	
5	0.71	0.07	2.1336	7.04	7.32	0	1.2011974	14245	0	2.1336	E	
6	0.75	0.07	2.1336	9.12	4.27	0	1.74719622	20720	0	2.1336	E	
7	0.14	0.07	2.1336	11.30	4.88	0	1.65799646	18425	0	2.1336	E	
8	0.75	0.07	2.1336	13.38	4.27	0	1.74719622	20720	0	2.1336	E	
9	0.01	0.07	2.1336	15.57	5.49	0	0.10819576	1295	0	2.1336	E	
10	3.05	0.07	2.1336	15.57	7.32	0	0.54699882	6475	0	2.1336	E	
11	1.22	0.07	2.1336	15.57	10.87	0	0.21039953	2590	0	2.1336	E	
12	1.22	0.07	2.1336	15.57	13.60	0	0.21039953	2590	0	2.1336	E	
13	0.75	0.07	2.1336	17.65	4.27	0	1.74719622	20720	0	2.1336	E	
14	0.75	0.07	2.1336	19.84	4.27	0	1.74719622	20720	0	2.1336	E	
15	0.75	0.07	2.1336	20.19	4.27	0	1.74719622	20720	0	2.1336	E	
16	0.75	0.07	2.1336	20.37	4.27	0	1.74719622	20720	0	2.1336	E	
17	0.75	0.07	2.1336	30.45	4.27	0	1.74719622	20720	0	2.1336	E	
18	0.75	0.07	2.1336	32.64	4.27	0	1.74719622	20720	0	2.1336	E	
19	15.85	0.07	2.1336	36.91	2.44	0	2.02619388	23670	0	2.1336	E	
20	3.05	0.07	2.1336	36.98	7.68	0	0.54699882	6475	0	2.1336	E	
21	3.05	0.07	2.1336	32.89	7.68	0	0.54699882	6475	0	2.1336	E	
22	3.05	0.07	2.1336	30.81	7.68	0	0.54699882	6475	0	2.1336	E	
23	10.36	0.07	2.1336	9.47	32.92	0	1.89639599	22815	0	2.1336	E	
24	11.58	0.07	2.1336	11.58	32.92	0	2.07479551	24665	0	2.1336	E	
25	11.58	0.07	2.1336	14.00	32.92	0	2.07479551	24665	0	2.1336	E	
26	0.14	0.07	2.1336	16.18	34.14	0	1.83799646	18425	0	2.1336	E	
27	2.44	0.07	2.1336	24.97	40.23	0	0.43679606	5180	0	2.1336	E	
28	4.88	0.07	2.1336	26.85	37.60	0	0.87359611	10360	0	2.1336	E	
29	4.88	0.07	2.1336	28.63	37.60	0	0.87359611	10360	0	2.1336	E	
30	0.01	0.07	2.1336	30.20	36.71	0	0.10819576	1295	0	2.1336	E	
31	0.01	0.07	2.1336	30.20	36.93	0	0.10819576	1295	0	2.1336	E	
32	0.01	0.07	2.1336	30.20	41.35	0	0.10819576	1295	0	2.1336	E	
33	0.01	0.07	2.1336	30.20	42.87	0	0.10819576	1295	0	2.1336	E	
34	1.22	0.07	2.1336	32.64	38.40	0	0.21839953	2690	0	2.1336	E	
35	0.01	0.07	2.1336	32.64	42.00	0	0.10819576	1295	0	2.1336	E	
36	15.85	0.07	2.1336	36.91	28.05	0	2.02619388	23670	0	2.1336	E	
37	2.44	0.07	2.1336	25.33	28.21	0	0.43679606	5180	0	2.1336	E	
38	2.44	0.07	2.1336	33.50	28.21	0	0.43679606	5180	0	2.1336	E	
39	2.44	0.07	2.1336	31.87	28.21	0	0.43679606	5180	0	2.1336	E	
40	1.22	0.07	2.1336	32.89	32.31	0	0.21839953	2690	0	2.1336	E	
41	1.83	0.07	2.1336	29.85	32.31	0	0.32759829	3885	0	2.1336	E	
42	1.83	0.07	2.1336	26.00	32.31	0	0.32759829	3885	0	2.1336	E	
43	2.44	0.07	2.1336	25.33	28.00	0	0.43679606	5180	0	2.1336	N	

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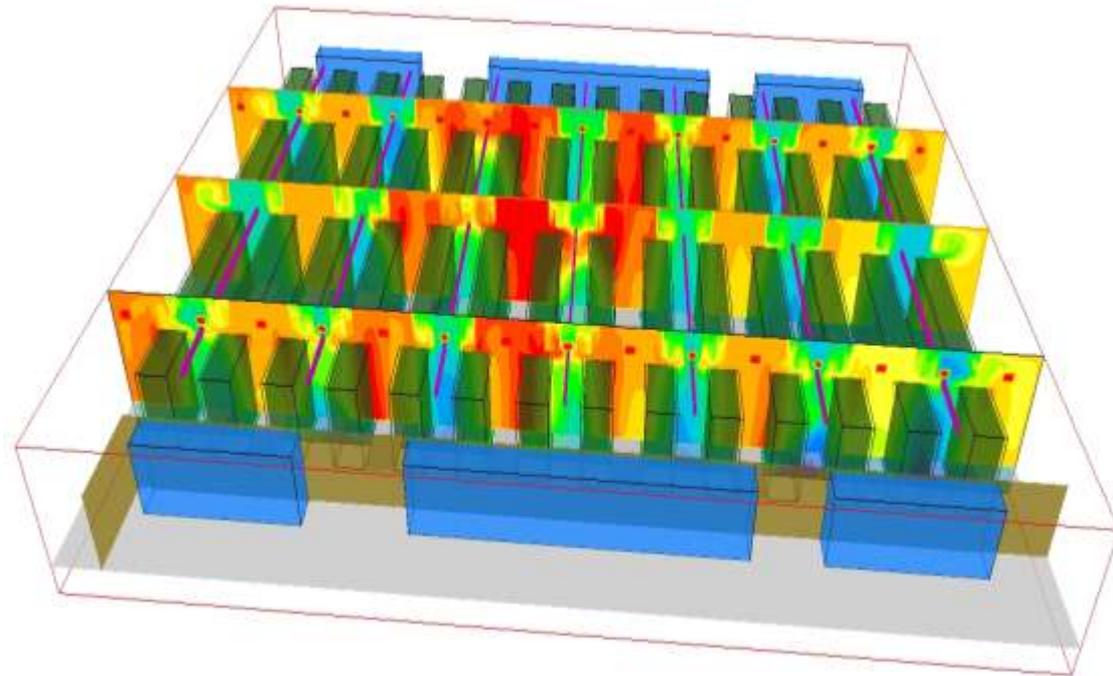


Data Centre Simulation

Seminar

Numerical results are displayed in tabular form with XY plots. In addition, temperature, velocity, humidity and pressure values are displayed in an interactive 3D graphical environment, together with residence-time data streamlines, iso-surfaces and concentration levels.

Results can be displayed using either SI or Imperial units.



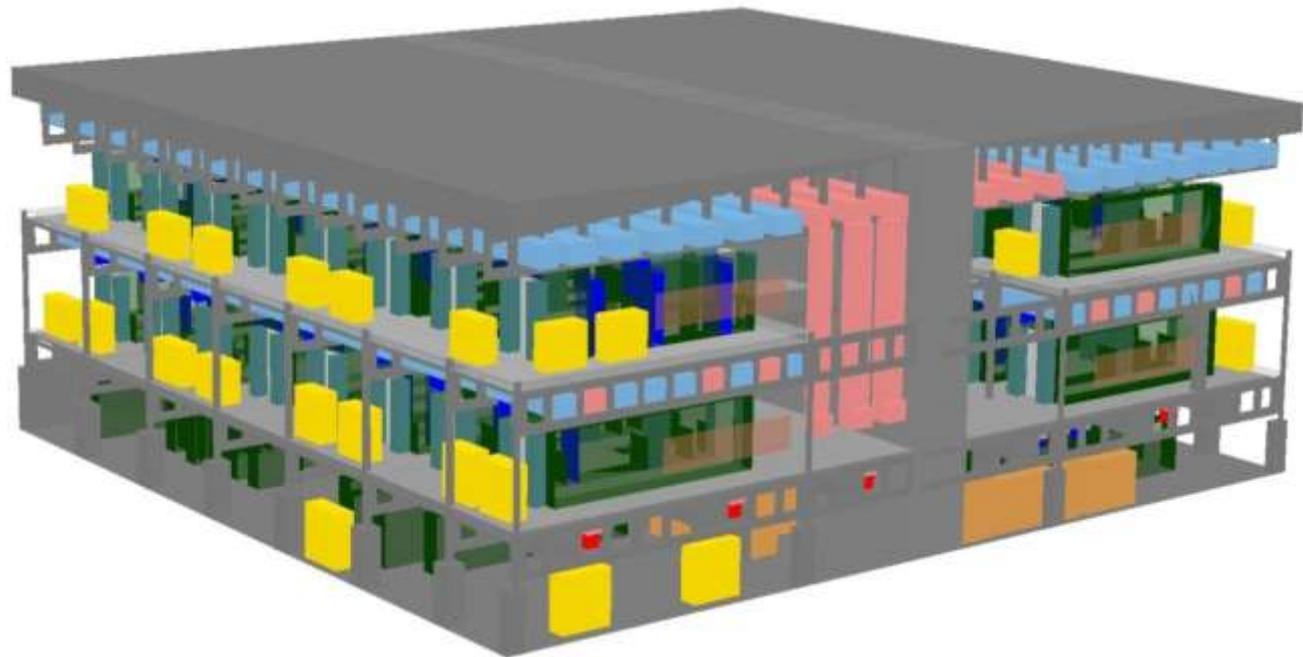
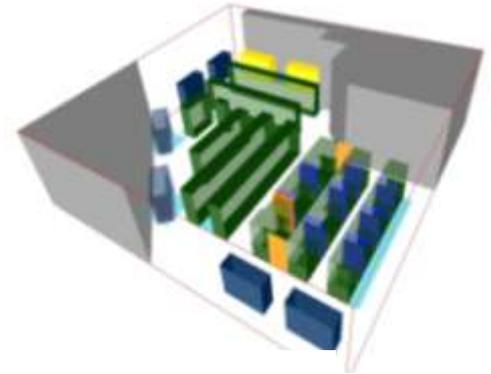
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Data Centre Simulation

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PHOENICS/FLAIR handles with ease complex room and equipment layouts, non-standard units, and both multi-room and multi-storey environments.



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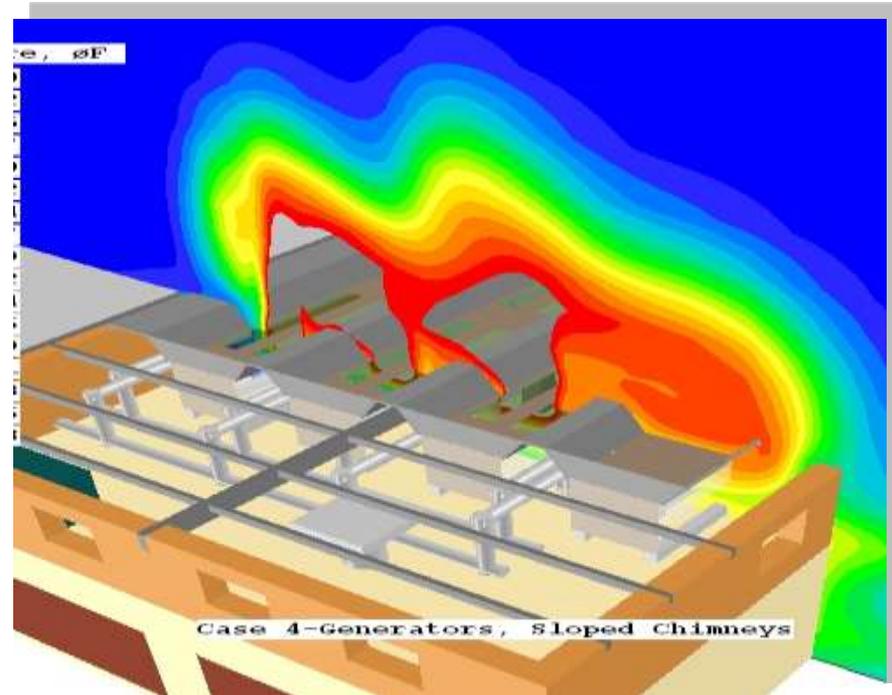


Data Centre Simulation

Seminar

External influences, such as solar gain, are readily introduced.

The versatility of PHOENICS/FLAIR is such that it is also appropriate for modelling related equipment, such as the performance of externally-located chilling units subject to the influence of varying environmental conditions, heat extracts from generators and exhaust outlets.



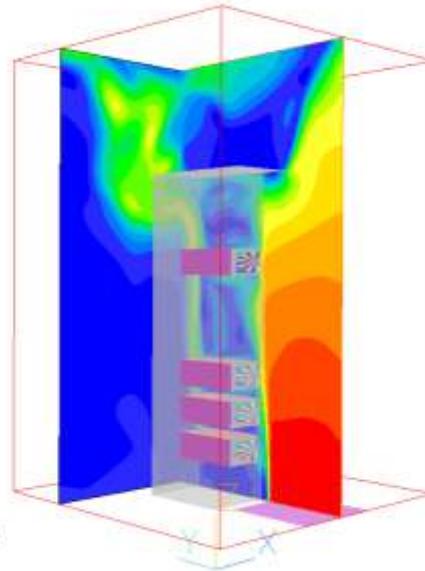
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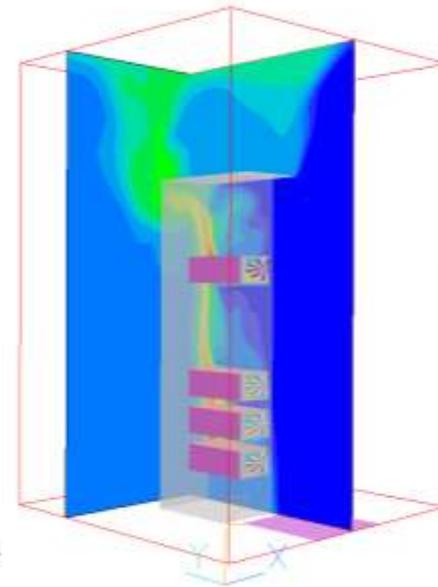
Data Centre Simulation

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Rack-level models for studying and optimising the performance of individual cabinets and their influence upon one another.



Rack Level Model



Rack Level Model

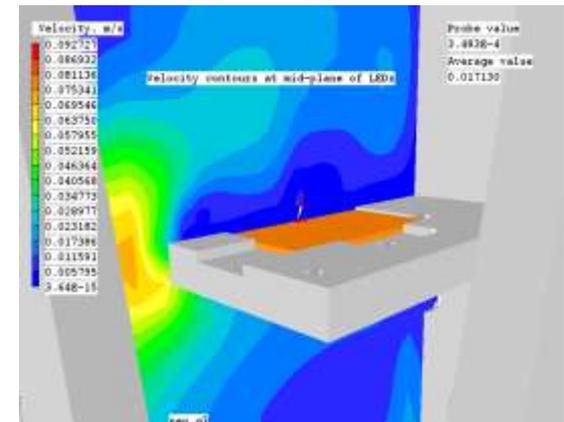
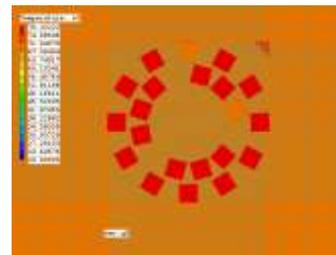
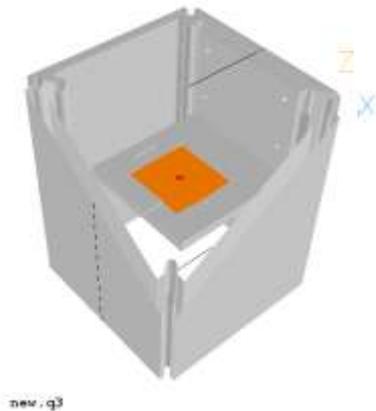
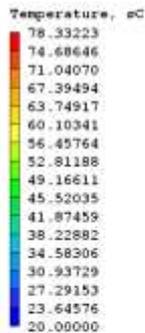
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Ventilation and cooling systems for racks, blades and circuit board LED heat releases can be studied and exported to the larger scale model.



From macro-scale to micro-scale data centre problems, PHOENICS/FLAIR offers a solution.

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