**Page 1: About**

Electrical Cooling Solutions is a thermal engineering company specialising in the thermal management of electrical machines and electronic systems.

We have two main areas of activity:

Providing ***expert design and consultancy*** services for ***thermal management of electrical machines and electronics systems***

Development, implementation and support of our ***custom thermal simulation tools***

***What Makes us Different?***

ECS have developed a simulation workflow which allows the accuracy of CFD to be exploited and integrated with thermal prediction tools. We therefore offer a more accurate analysis of machines without compromising on speed.

We are motivated to improve the **speed** and **cost effectiveness** of CFD modelling for electrical machine design. Our customised tools and workflow allow the accuracy of CFD to be exploited and integrated with quicker thermal modelling tools. This allows quick design exploration and optimisation whilst maintaining accuracy.

Combining these state-of-the-art toolsets with our experience of different machine and system technologies, applications and thermal management systems, we are able to offer expert and cost-effective design tools and services.

Image 1

**Page 2: Simulation Tools**

Electrical Cooling Solutions have developed a series of custom thermal simulations tools, specifically configured for electrical machines and power electronics systems.

We have developed our toolset and workflow to allow the accuracy and detailed insight of CFD to be utilised without the need for expensive commercial software or time-consuming user input. We aim to facilitate a quicker process towards optimised designs, giving significant competitive advantage over non-specialised thermal design processes.

Motivated to improve the speed and cost effectiveness of CFD modelling for electrical machine design, we have developed a CFD process using OpenFOAM tailored for electrical machines. This process provides a great level of automation, whilst maintaining full control.

CFD data links to a fully flexible and detailed thermal network suite, allowing quick and accurate temperature predictions to be made. This facilitates an improved optimisation process of system parameters.

Customised OpenFOAM CFD toolset, tailored for electrical machines and electronics

* Improved speed: minimised setup time – simple CAD input and mesh settings
* Robust meshing: rarely requires mesh regeneration to improve cell quality
* Affordable: No expensive commercial licenses – costs don’t scale up with computing power
* Greater automation: Customised workflow for electrical machines; reduced user input; parameterised analysis

Thermal modelling using our in-house thermal network tool

* High speed design exploration to expedite the route towards design optimisation
* Flexible: able to simulate conventional and novel machines, as well as incorporate innovative thermal management systems
* In-built library of correlations for predicting flow and loss behaviour

Coupling between tools

* Feed reduced order flow models from CFD into thermal networks
* Improved accuracy boundary conditions versus packages that rely on broad empirical correlations
* Ability to couple to wide range of thermal modelling packages including commercial codes

Why OpenFOAM

Our CFD process is based around the OpenFOAM (Open Field Operation and Manipulation) CFD Toolbox

Advantages of OpenFOAM:

* 100% Free
* Technologically competitive with all commercial solutions
* Full access to source codes and allows for tailored solutions
* Accurate results and in many cases faster turnaround times than commercial options
* Fully automated processes easily achieved through simple scripting
* Ability to rapidly test geometry and boundary condition parameters for time and cost-effective optimisation of a very wide range of problems
* Hardware can be effectively scaled with no additional licensing costs

It is trusted by many reputable companies with big budgets in different sectors, including F1, automotive, leisure and sport and engineering.

Please get in touch if you’d like to learn more. We are able to offer demonstrations of our simulation toolset.

*Image 2*

PAGE 3: **Services**

**We offer a range of services, and work with our customers to offer flexible and bespoke solutions in line with their needs**

Please get in touch if you’d like to learn more. We are able to offer demonstrations of our simulation toolset.

**Design and Consultancy services and support contracts**

**We will work with you on your design project to enhance product performance using our experience, specialist toolsets and know-how. We can both develop new products and improve existing range, and are able to use the ECS toolset and workflow or follow company processes and design tools**

* **Every stage of a design from feasibility studies and concept comparisons to design optimisation**
* **Review and improve cooling systems for existing designs**
* **CFD, thermal network modelling, simple analytical analysis**
* **Our own specially developed toolset or with software of customers preference**

**Use of ECS as ‘simulation house’**

Providing simulation analysis for your projects, we can do the simulating and number-crunching for your project, providing you with all the necessary data needed for your design decisions.

By using our simulation process and hardware, we take away the need for you to invest time in learning new processes and purchasing hardware for running simulations.

ECS provide computing power: through our high-end cluster and access to a wider range of clusters when necessary

**Integration of ECS toolsets**

We can help to integrate our toolset into your own processes, customised to your specific needs. By providing you with the software, training and ongoing support, you can utilise our specially developed process into your everyday activities.

**Collaboration on development**

We are continually improving our tools and looking for ways to incorporate advanced cooling methods or special machine types. Our experience shows that engaging and collaborating with commercial end users during development strongly enhances outcomes.

We are currently interested in working with companies to incorporate the CFD simulation of spray and evaporative cooling into our toolsets.

*IMAGE SLIDER: Images 1,2,3*

**Page 4: CONTACT**

We offer a range of services, and work with our customers to offer flexible and bespoke solutions in line with their needs and welcome all enquiries.

Please get in touch if you’d like to learn more. We are able to offer demonstrations of our design toolset and services.

*Contact Form*

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