

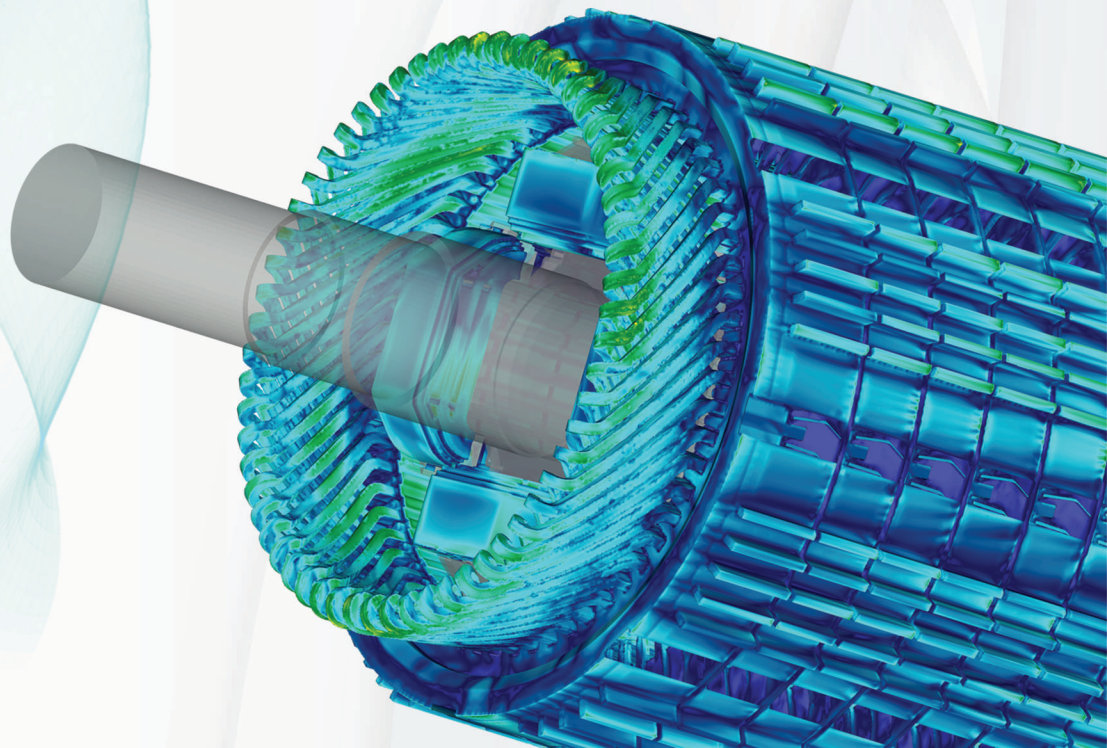
Electrical Cooling Solutions is a thermal engineering company specialising in the thermal management of electrical machines and electronic systems.

We specialise in the following areas:

- Design and consultancy
- Development, implementation and support of custom thermal simulation tools

DESIGN AND CONSULTANCY

- We provide effective thermal design solutions for electrical machines and electronic systems
- We cover every stage of a design for feasibility studies, from concept comparisons to design optimisation
- We can review and improve cooling systems for existing designs
- We work with our own specially developed toolset or with software of customers preference
- We offer CFD, thermal network modelling, simple analytical analysis
- We are excellent collaborators and able to work closely with design teams from different technical disciplines to deliver solutions optimised towards product requirements and specifications



CUSTOM SIMULATION TOOLS

We are motivated to improve the speed and cost effectiveness of CFD modelling for electrical machine design.

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



Customised OpenFOAM CFD toolset, tailored for electrical machines and electronics

- Improved speed: minimised setup time
- 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



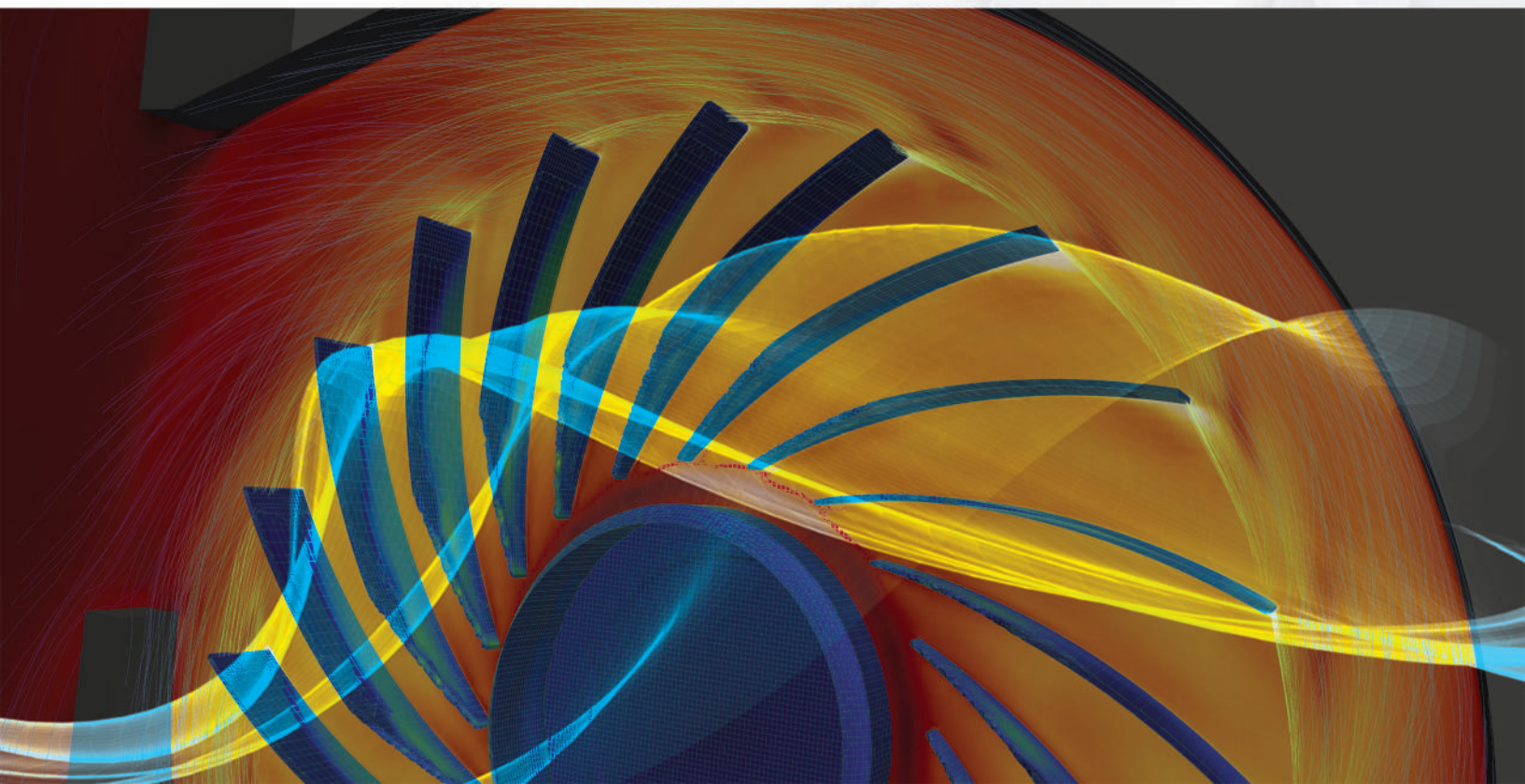
Thermal modelling using our in-house thermal network tool

- 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





EXPERIENCE OF WORKING WITH AND FOR COMPANIES AND ACADEMIC INSTITUTIONS **ACROSS 8 COUNTRIES**

WE HAVE A WIDE BREADTH OF EXPERIENCE, INCLUDING:



TECHNOLOGIES

Conventional Machines

Synchronous (PM, Field Wound, Reluctance) Induction

Novel Machines

Hybrid technology

Power Electronic Systems



APPLICATIONS

Power generation:

Marine, stationary power plant, oil/gas offshore, hydro, wind

Industrial:

pump drives, servo machines

Traction and Propulsion:

EV, Marine



THERMAL MANAGEMENT

Passive and active cooling

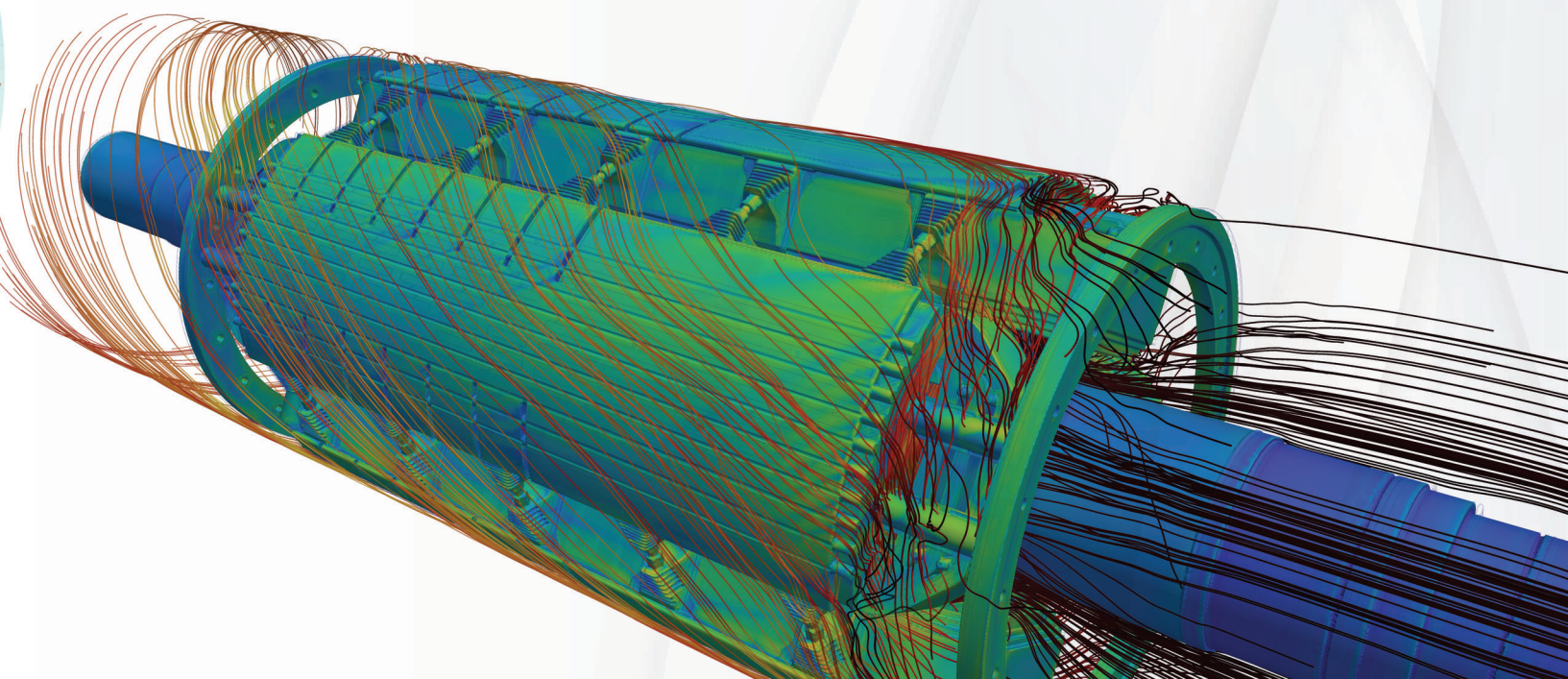
Fan driven flow

Liquid Cooling

Spray cooling

Jet impingement

Advanced cooling measures





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

DESIGN SERVICES AND SUPPORT CONTRACTS

- › We 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 ranges
- › Able to use ECS toolset and workflow or follow company processes and design tools

USE OF ECS AS 'SIMULATION HOUSE'

- › Providing simulation analysis for your projects
- › ECS provide computing power: through our high-end cluster and access to wider range of clusters

INTEGRATION OF ECS TOOLSETS

- › Adopting toolsets to your company, including training and ongoing support
- › Demos and evaluation periods available

COLLABORATION ON DEVELOPMENT

- › Advanced simulation of cooling methods, such as spray or evaporative cooling
- › Customisation of toolsets for special machine types or cooling arrangements

We welcome enquiries about our services, please contact us to learn more:

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www.e-cooling.co.uk