

Heat-optimised design requires both good heat distribution within the module and good heat transfer into and out of the appliance. However, good thermal management also requires constant communication and coordination between all parties involved. The 3D visualisation of the product and the heat paths can help here as a basis for communication and a driver of innovation.

ALPHA-EC Academy – building a bridge between science and engineering

ALPHA-Numerics GmbH has almost 30 years of experience in the field of 'electronic cooling'. To this end, we are primarily an engineering firm that has made a name for itself in this specialised niche. We support many of our customers as a simulation service provider and, based on the simulation results, advise them on the extent to which optimisation potential is still available. We also sell the software (CelsiusEC from Cadence) that we use every day as engineers.

On this basis, we have acquired extensive specialist knowledge over many years, which is appreciated and readily used by our customers.

To ensure a professional, structured and efficient transfer of this knowledge, we have launched the ALPHA-EC Academy.

This offers every engineer who is willing to think outside the box comprehensive practical training. This includes basic physical knowledge, any useful rules of thumb, but also practical approaches to developing a cooling strategy.

Building on this, we train your engineers in how to use the CFD software CelsiusEC and, if you wish, we will also support them in creating models and solving your tasks in the initial months.

Electronics Cooling

All you need to know from engineer to engineer

- 01 Electronics Cooling Basics
- 02 CelsiusEC Training Basics
- 03 CelsiusEC Training Individual Advanced
- 04 CelsiusEC Training Advanced Functions
- 05 CelsiusEC Training Special Tips & Tricks
- 06 CelsiusEC Service Start-up assistance

Who should be trained?

You don't become electronics cooling specialist overnight. Depending on their previous responsibilities, engineers require different areas of specialisation.

Building on the basic training, we set individual priorities in our advanced courses to give **mechanical engineers, hardware designers or practitioners from the measurement laboratory** the understanding and functional knowledge that they really need to solve their tasks.

Online - Face to Face Training

We believe it is very important that you are trained by physically available trainers rather than by video. We use TEAMS and share our screen during the training, which projects slides, live demonstrations in the software and a whiteboard for special explanations. This way, direct questions from participants can be answered during the training.

Training Material

We will send you the documents as a PDF document before the training date so that you can print them out in advance for notes during the training.

Our training documents are subject to copyright and may only be passed on at the locations within the company that have registered at least one participant for training. Disclosure to third parties is not permitted.

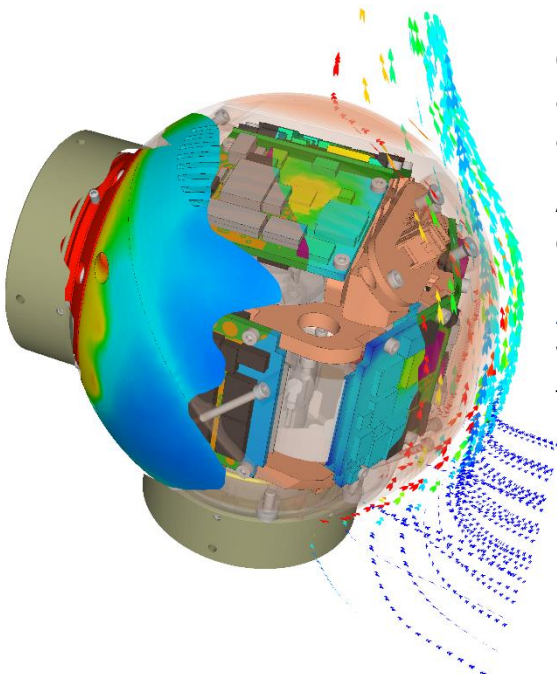
No public training sessions

Our training courses are customised. We are happy to sign an NDA in advance so that customer projects can also be discussed during the advanced training courses.

A 128-bit encrypted cloud solution is available in our company for data exchange (physical cloud at our location).

ALPHA-Numerics as contact partner

We are more than just a software dealer. We transfer practical knowledge to our customers and help them to keep a "cool" head.



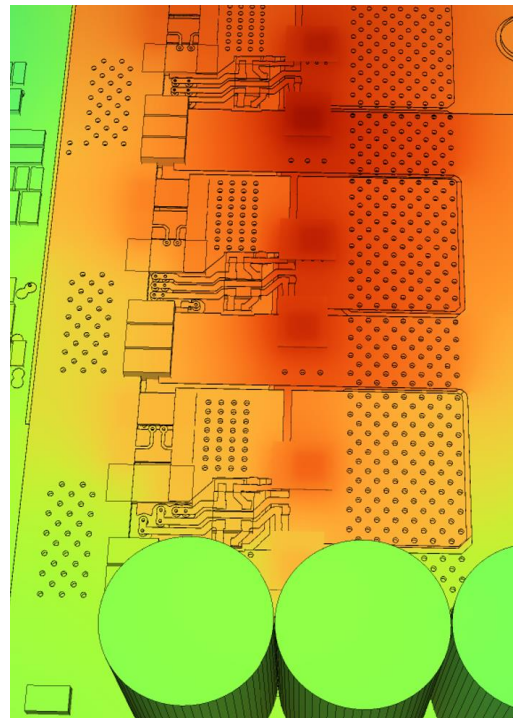
01 Electronics Cooling – *Basics*

- 2 Online-Blocks à 3h
- € 1.500,00 in total – If the two blocks cannot be implemented within one day due to the time difference: € 1.800,00
- max. 6 attendees
- German or English language
- Seminar documents will be available for download

This 6-hour seminar offers comprehensive basic knowledge for engineers who work in the field of electronics cooling. The focus of this seminar is on a practice-oriented, scientifically understandable treatment of topics for engineers.

Seminar Topics

- Insight into the physics of heat paths and how they relate to your product development
- How thermal resistors control heat flows
- Possible heat sources in an electronic product
- Electronic components and their thermal key values
- Printed circuit board – heat paths and bottlenecks
- Heat sink design – physical goal, design, optimisation, material science
- Interface material (paste, graphite foil, foil, pads, phase-change material, casting)
- The fan in use
- Air direction can be guided
- The fluid cooler - Overview
- Indoor devices / outdoor devices
- Installation conditions and their influence on your product.



02 CelsiusEC Software Training – *Basic*

- 4 Online-Blocks à 2h dispersed on 2 days
- € 1.500,00 in total
- max. 4 attendees
- German or English language
- Seminar documents will be available for download
- **This Basic Training is obliging to have access to our CelsiusEC Support-Hotline**

This is a standard seminar developed by ALPHA-Numerics based on 15 years of experience in the optimal use of CelsiusEC. We train new users in how to use the CelsiusEC software efficiently and provide them with the most important background information for creating a virtual model that has the same thermal properties as the real object.

03 CelsiusEC Software Training – *Individual Advanced*

- 2 Online-Blocks à 3h
- € 1.500,00 in total – If the two blocks cannot be implemented within one day due to the time difference: € 1.800,00
- max. 4 attendees
- German or English language
- If a Pre-Model-built is required, the extra effort will be quoted separately
 - Please contact us for a Meeting (30 Minutes)
- Seminar documents will be available for download

This seminar is offered for all CelsiusEC Users with existing experiences in using the software.

To prepare this individual training session, we need to receive all relevant data from you, to build a Simulation model.

Our specialists build the model in CelsiusEC and prepare parallel some training slides. If required, we will solve this case in CelsiusEC and will also discuss with you the results and the key information we can read to optimize the electronics cooling.

The costs for this seminar will be a combination of one simulation service and the seminar price.

04 CelsiusEC Software Training – *Advanced Functions*

- 2 Online-Blocks à 3h
- € 1.500,00 in total – If the two blocks cannot be implemented within one day due to the time difference: € 1.800,00
- max. 4 attendees
- German or English language
- Seminar documents will be available for download

In addition to the Basic Software Training, the user can require using advanced functions of CelsiusEC like:

- Transient Simulation
- Multi Fluid Simulation
- Joule Heating
- Advanced CAD-Handling
- Solar Radiation for Outdoor Applications

05 CelsiusEC Software Training – *Tips & Tricks*

- 1 Online-Blocks à 3h
- € 600,00 in total
- max. 4 attendees
- German or English language
- Please contact us for a Meeting (30 Minutes)
- Seminar documents will be available for download

Do not underestimate the efficiency of an experienced CelsiusEC user. With many small tips & tricks, errors can be avoided and the time required for work can be greatly reduced. In this seminar, several tips & tricks are discussed, that usually cannot be included in the standard training due to time constraints.

This seminar changes from year to year, and is mostly geared towards new functions in CelsiusEC, which find their way into the software from release to release as little helpers.

06 CelsiusEC Service – *Start-up assistance*

- € 5.000,00 in total (for a group of 4 users)
- Service for 3 months
- German or English language
- Please contact us for a meeting (60 Minutes). We will present the advantages of this service

Every company starts using the software at some point. However, after the training, you are usually left alone when it comes to model consulting.

Our competent technical hotline offers a great deal of support with regard to the software application. We are fast, competent and can usually solve your problem within a day and instruct you in such a way that you understand the solution yourself in the future.

In addition, many customers also ask for a competent partner who checks the model quality in the first 3 months and helps to create physically correct models, to interpret the results correctly and thus to establish the simulation tool in the company.

During this service period, we check your simulation models after they have been built, looking for model errors and instructing the user on how to design the mesh efficiently to obtain a stable, efficient solver process.

ALPHA-Numerics GmbH as technical partner

A reliable partner for training and technical support

We don't just sell the software. We also use CelsiusEC every day in our engineering office for contract simulations. Since the company was founded, we have worked for several hundred companies worldwide as an extended workbench and offer our experience and expertise in building virtual simulation models. This service covers the simulation of the heat paths as well as the evaluation and joint optimization of the cooling system.

Most of our customers come from the Automotive and Transportation Industries as well as the Automation Technology. However, we also offer a wealth of experience in simulation and Project optimization in the Medical Technology, Telecommunications, Lighting Technology and Powertooling Industry.



- Main sponsor and speaker at the CoolingDays
- Organizer of webinars for further education
- Publication of many technical articles
- Free online seminars on CelsiusEC with test license
- Editor of various training documents
 - Electronics cooling
 - Creation of physically correct simulation models
 - Possible applications for CelsiusEC
- Technical partner in research projects

As specialists in electronics cooling, we not only sell the relevant software, but we also know how to use it efficiently and successfully and share our expertise with you.

We train your engineers, developers and IT specialists in the use of CelsiusEC software in customized workshops and training courses. We also offer individual training courses - based on the customer's own product data.

We are expert in a specialized field that is indispensable in any electronics development. And we are not just talking about hardware design (PCB layout & assembly), but also about the constructive design of an electronic device, i.e. the enclosure and mechanical construction, the choice of materials, the surface coating, the device architecture and thus the complete cooling strategy.



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