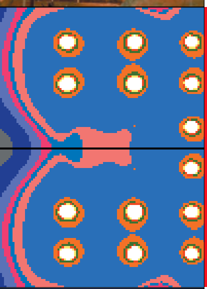




F.I.C. (UK) LIMITED

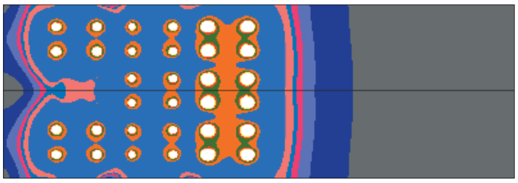
Tomorrow's Technology Today

FIC's Mathematical Modelling Capabilities and Computational Fluid Dynamics

FIC's international reputation is built not only on its being in the forefront of furnace technology development but also on its unparalleled expertise and experience enabling it to fulfil precisely a customer's needs.

FIC can use the very latest in Mathematical Modelling and Computational Fluid Dynamics to give the client the highest degree of prognosticatory accuracy when it comes to any facet of the planning of furnace technology and how it will perform.

Whilst the Mathematical Modelling can optimise electrode location, transformer characteristics and design, our Computational Fluid Dynamics provides extremely accurate simulations of the physical, chemical and thermal processes which will take place during glass production.



Mathematical Modelling

- *Well-proven world-wide.*
- *Accurate to better than 1%.*
- *Saves money: possible use of existing customer hardware.*
- *Saves money: transformer characteristics, voltage and current range ensure customer does not pay for design inefficiencies.*
- *Inaccuracy in the determination of the resistivity of the glass and consequent transformer size could result in the transformer overheating and failing.*
- *Critical to the design of any boost.*
- *The ultimate in customising: client can view options to achieve objectives specified by client's own requirements and FIC's design criteria.*

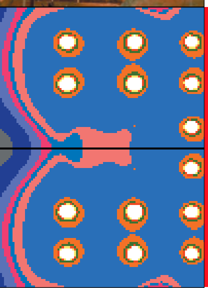
Computational Fluid Dynamics

- *Reduces design time and expense: enables you to evaluate and optimise performance of several design concepts before a physical prototype is built and tested thus reducing the number of design iterations.*
- *Reduces significantly design cycle time.*
- *Helps guide other forms of testing, thus reducing testing costs.*
- *Improved productivity.*
- *Reduced scrap rate.*
- *Immense cost-saving.*
- *Reduces emissions.*

- **Design and Build**
- **Electric Furnaces**
- **Electro Boost**
- **High Q Holders**
- **Electrode Holders**
- **HVP Forehearth**
- **Iso-Thermal Unit**
- **Bubbler Systems**
- **Electrode Maintenance Unit**
- **Drains**
- **Mathematical Modelling**
- **Engineering Services**

The World's Number One in Furnace Technology





FIC's Mathematical Modelling Capabilities and Computational Fluid Dynamics

Mathematical Modelling

A cost-saving way in which to optimise performance and efficiency, FIC's Mathematical Modelling consists of a software programme which creates a highly accurate simulation of the electrical field in a spatial conductor with constant electrical conductivity.

The integral parameter of the rod electrodes can be determined and simulation of several galvanically isolated systems is possible.

Rod electrodes can be positioned in any orientation within the surface, e.g. sidewall, bottom, top or even at oblique angles. With minor adjustments to the software, plate electrodes can also be simulated.

The maximum number of electrodes that can be simulated is 48. Individual electrode lengths can be chosen freely as can the electrode radii.

It is possible to calculate the magnitude and phase of electrode currents on the basis of pre-defined circuits and the given voltages. It is also possible to give a tabular listing of the magnitude and phase of calculated electrode currents in relation to their corresponding reference voltages.

Calculated current and voltage vector diagrams can be displayed graphically of all currents and voltages of several galvanically separated electrical heating circuits.

This method can also provide a calculation of the distribution of the electrical power density shown in the form of a contour diagram. Although calculated in three dimensions, only a two-dimensional cross section of the model can be shown at any one time.

The definition of the contours is based on the average of the power density which, in turn, is multiplied by scaling factors shown graphically by a graduated scale of colours.

Studies can include the use of existing client transformers to establish if they can be fitted to a new furnace or a revised boost, thus saving the client the cost of new hardware.

Detailed model study reports can be provided allowing the client to study various boosting options such as optimising existing systems or engaging in complete redesign.

Computational Fluid Dynamics

FIC together with its partners provides a very comprehensive suite of Flow Modelling Software for the Glass Industry enabling a client to study fluent models of every stage of the glass making process. This includes: furnaces, melters, refiners, forehearths and spout bowls as well as glass forming operations such as drawing, pressing, blowing and fibre production.

The insight gained improves designs, boosts productivity and reduces considerably production costs and pollutant emissions.

Our software is backed by technical support and consultation from engineers whose specialisation is the resolution, by simulation, of problems in the glass and furnace technology industries.

It incorporates leading-edge numerics, algorithms and physical models as well as advanced pre-processing, including geometry and mesh-creation/import and post-processing (visualization) tools.

The easy-to-use interface and unrivalled interactivity of our software makes it immensely popular among researchers, designers and process engineers alike.

Both the systems described above once again underline FIC's commitment to customer satisfaction and the company's much heralded commitment to further raising the standards of both performance and technology within the industry.

- Design and Build
- Electric Furnaces
- Electro Boost
- High Q Holders
- Electrode Holders
- HVP Forehearth
- Iso-Thermal Unit
- Bubbler Systems
- EMU
- Drains
- Mathematical Modelling
- Engineering Services

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