



TranscenData provides quick fix for fast food

Ready meals are becoming increasingly popular. Spending the time preparing a gourmet dish is not what most people have in mind after a hard day's work. The problem is that after a five minute burst in the microwave, very rarely does your meal come out piping hot and looking like the luxurious product that was advertised. A typical scenario is a rather unappetising dish which is either burnt or cold. However there is good news.

Companies today are taking the ready meal market very seriously and creating the ideal microwave dinner takes a great deal more time and money than many might think. The science and technology behind it is extremely complex, and for an industry worth billions those producing ready meals are prepared to pay for perfection.

The industry

Recent figures show that ready meals are one of the highest growth sectors in the food market having an estimated value

of £11.5bn in 2001. The sector as a whole has demonstrated a substantial level of market development and innovation over the past four years. New product technologies and new options, such as organic varieties accompanied with a growing interest for international foods and restaurant quality meals are increasing in importance. In addition, a variety of social changes have continued to drive the market forward, with people's increasingly busy lifestyles being a key factor for ready meal purchases.

For many companies hoping to make their millions on ready meals they must perfect a meal that not only looks good on shelf but also tastes great when reheated. To get this winning combination for improved quality companies often require specialised technical help.

ProEng Solutions

ProEng Solutions, based in Northamptonshire; specialises in product and process engineering projects for the food industry.

Using its experimental facilities and simulation capabilities ProEng provides its clients with fully proven solutions to food product and process engineering problems. One of its areas of expertise is in the field of microwavable products. ProEng Solutions often undertakes work for companies developing microwavable ready meal and snack products and who need to ensure that their product will re-heat optimally without burning the product or leaving cold spots. The problem they face is using packaging which has consumer appeal while at the same time ensuring that the product reheats effectively and delivers on visual appeal, taste and texture.

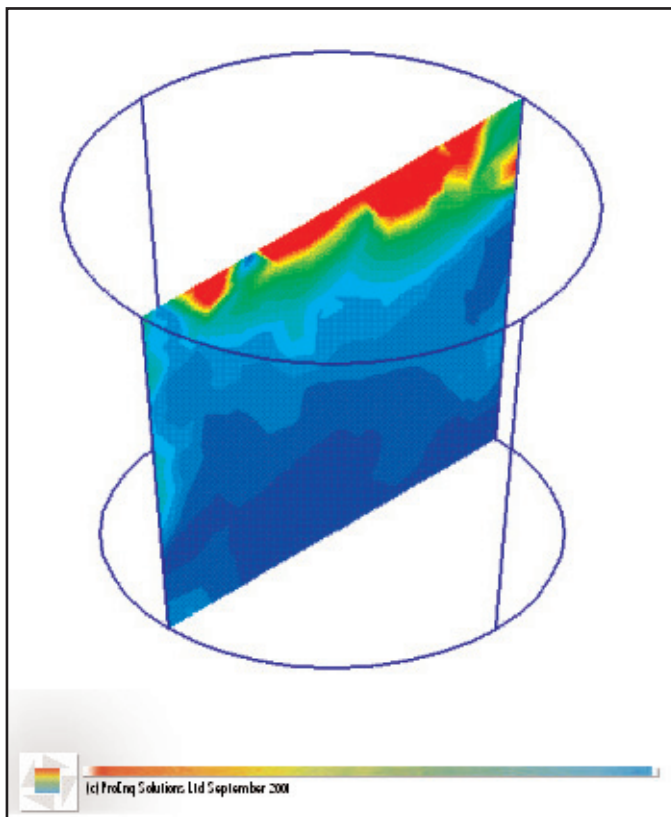
Managing Director of ProEng Solutions, Dr Sidi Chouikhi explains: "Ready meals need to be carefully targeted to appeal to and match the needs and expectations of consumers. This creates conflicts in terms of packaging design between the requirements for consumer appeal and those for effective microwave reheating. Companies will select packaging which will catch the customers eye, but often this packaging will not aid the microwave reheating of the product leaving the consumer disappointed with their meal."

CADfix CAE

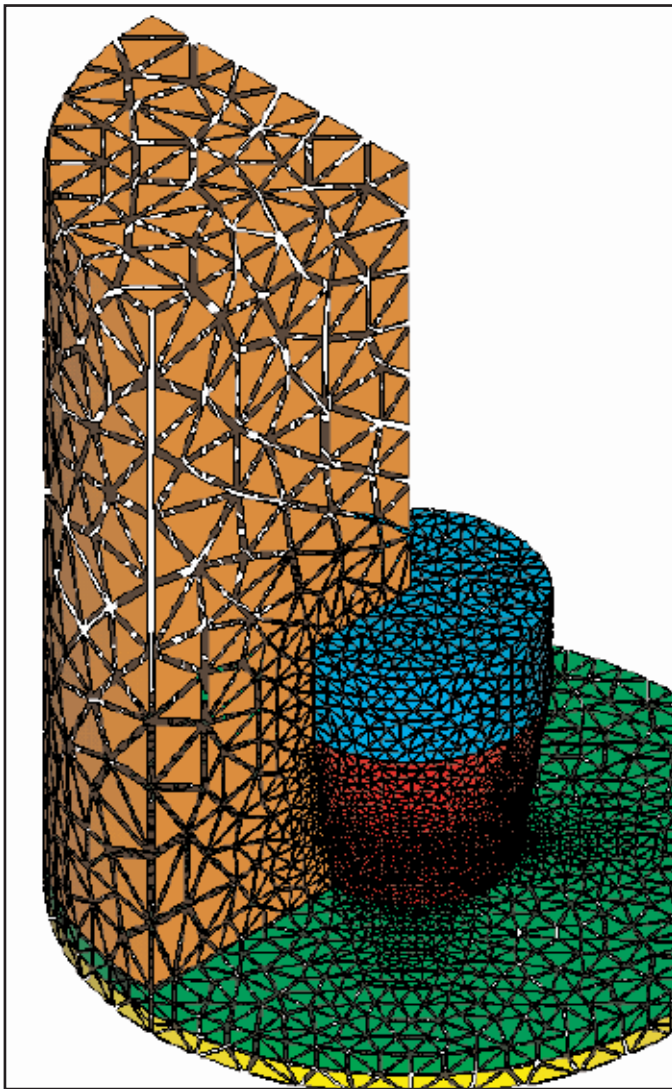
One of the company's key tools in its problem solving process is the leading data interoperability solution, CADfix from TranscenData Europe.

CADfix tackles fundamental inconsistencies and inaccuracies which make the efficient transfer of solid modelling geometry between different CAD systems and downstream applications such as finite element analysis (FEA) all but impossible. There is a specific version of CADfix designed especially for CAE users called CADfix CAE, and this particular package is what ProEng employs.

CADfix CAE is used in the analysis of food processes for microwave reheat performance on products, particularly ready



Microwave product simulation



Microwave interior mesh

meals. Factors that have to be considered when looking at microwavable products include its safety and quality requirements, flavour, taste, functionality and texture.

Dr Chouikhi explains, “We need to look into a microwave to see what is really happening. What if the shape of the packaging or the product layout were changed, how would the product reheat? CADfix has a hugely important role to play in this process.”

ProEng uses its experimental facilities to measure temperatures around the product during and after heating using infrared thermal imaging as well as conventional thermocouples. This visually demonstrates what is happening to the food inside the microwave as it is being heated.

In parallel with the experimental evaluation, ProEng uses CADfix to generate geometric models of the product inside a range of microwave ovens. This process involves the writing of macros to generate the oven geometries and the product geometry. These macros enable a wide range of alternative product shapes and configurations to be generated and placed at various positions in the ovens.

Next the meshes are used to perform electromagnetic and thermal simulations using software currently being developed in a joint collaboration between ProEng Solutions and a modelling group at a French University.

The results of the simulations are analysed and data is visualised using the post-processing capabilities available in CADfix. This allows ProEng to prepare movies of coupled power and temperature profiles for use in presentations to client companies.

The combination of experimental and simulation data allows ProEng develop and propose solutions to client companies about how to improve the reheat performance of their products. The proposed solutions often involves one or more of the following routes: new packaging designs, the use of foil shielding, re-configuration of product layout and manipulation of the product recipe to change the microwave penetration properties of the product. ProEng solutions also uses its simulation capabilities and its capabilities to alter the microwave properties of foods to design solutions which gives differential heating and producing crisping of such products as pizza bases and spring rolls.

Dr Chouikhi explains: “We’re currently looking at a ready-meal concept which includes sauce and rice on one side and spring rolls on the other. The requirement is to re-heat these two sides simultaneously and to end up with suitably heated sauce and rice and hot and crisp spring rolls. We are currently exploring a number of packaging and material options using simulations and experiments in an attempt to develop a suitable and commercially viable solution which will allow the meal combination to be microwaved all at once. This will save time and make the product more convenient for the consumer.”

Conclusion

The amount of science and technology involved in making ready meals is immense. With such a huge market for these products it is important for companies to get the production process right. Through the work that ProEng carries out, companies gain a much greater understanding of how to develop tastier, healthier and more efficient microwave meals. CADfix’s use throughout this process is vital in providing an important technical analysis on this entire development process.

Dr Chouikhi concludes: “CADfix has proved to be such a vital tool in our research and analysis of microwave meals. We have come to realise that this software package is essential in providing us with the simulation capability necessary in our projects and in allowing us to effectively communicate the results of our analysis to our client companies .”

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