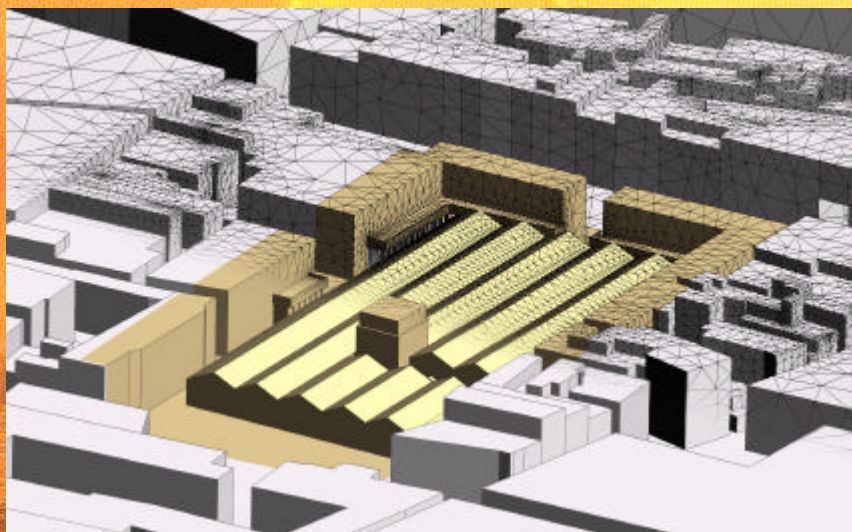
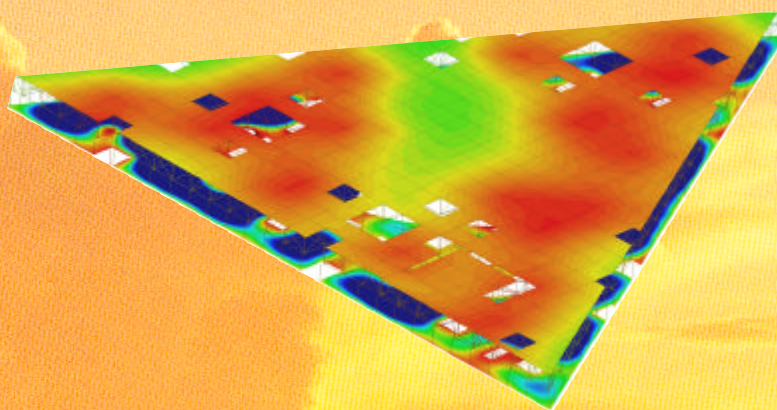


# GiD<sup>®</sup>

Vol.2, June 2003

# Times

The Personal Pre/Postprocessor Magazine



## Contents:

GiD 7 for Apple's Mac OS X

FractalComs

Food Technologies

Powder Compaction

Forum 2004

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Symbols in GiD

Gid Conference 2004



# presentation

Welcome

2002 was certainly a GiD year. In a strange period full of uncertainties worldwide, we were lucky to enjoy some very good moments thanks to GiD. The memorable GiD events started in early 2002 when the first GiD conference was held in Barcelona between 20-22 February 2002. The meeting attracted some 70 participants from different countries. Papers presented at the conference described original applications and developments of GiD in many scientific and technical fields.

The 2002 European Award of the Information Society Program (IST) of the EC was granted to GiD in an important IST meeting held in the city of Düsseldorf in Germany. This important award meant a high recognition of the capabilities of GiD as a useful tool for RTD work and practical applications of professional software in many areas of science and engineering.

The third major achievement of GiD last year was the 2002 City of Barcelona Award for Technology Innovation. This award is offered annually to relevant persons and organisations in different areas of culture, science and technology. The Award was delivered by the Mayor of Barcelona in a big ceremony held at the Barcelona Town Hall on February 11th 2003.

The above achievements certainly have meant a lot for the GiD development team and indeed for all the staff at the International Centre for Numerical Methods in Engineering (CIMNE).

As Director of CIMNE and on behalf of the GiD Development Team I would like to take this opportunity to present these achievements to the many GiD users around the world. Your continuing advice and support has been essential in making GiD a successful reality.

Many thanks and have a very GiD time.

**Eugenio Oñate**  
Director of CIMNE

## Cover pictures:

- Left: Analysis of the Agbar Building, in Barcelona, scaled deformation of the structure under the wind, and force distribution (concentration in red) and beam momentum (courtesy of 'R. Brufau I Associats')
- Bottom Right: actual construction process of the Agbar Tower.
- Top Right: Metal roof structure of the Barcelona Culture Forum '04, at the end of the Diagonal Avenue crossing Rambla de Prim (courtesy of 'R. Brufau I Associats').
- Center: -La Boqueria- market, in Barcelona, ACIS model for an air flow analysis in cooperation with the "Institut Municipal de Mercats de Barcelona".



## GiD: 2002 EUROPEAN IST PRIZE WINNER

GiD has been selected as "2002 EUROPEAN IST PRIZE WINNER" by the European Information Society Technologies Prize organization. More information can be found at the European Information Society Technologies Prize organization. [http://www.ist-prize.org/winners/winners\\_02.html](http://www.ist-prize.org/winners/winners_02.html)

## Ciutat de Barcelona Prize 2002

On February 11th, the Prize 'Ciutat de Barcelona' 2002 of Technological Research was granted by the Barcelona City Hall to the researchers of the International Centre of Numerical Methods in Engineering (CIMNE): Eugenio Oñate, Ramon Ribó, Miguel Pasenau de Riera, Enrique Escolano and Jorge Suit Pérez, for the development of the GiD system. <http://www.bcn.es/cultura/premisciutatbcn2002>



## GiD in Japan

Last May, a group of experts of the important Japanese company CRC visited the GiD team to agree in a partnership program, to explore common technological interests for the future. CRC Technical Corporation is a division of the group CRC Solutions Corp., devoted to the sales and entrusted maintenance of computers, development and sales of system products, and systems sales. [http://www.crc.co.jp/koho-english/cover\\_e.html](http://www.crc.co.jp/koho-english/cover_e.html)

GiD was also announced in the JSME (Japan Society of Mechanical Engineers) by our reseller in Japan, Mr. Kawaoka, General Manager of the Engineering Division of Digital Solution INC.

<http://www.jsme.or.jp/dsd/Newsletter/no23/text.html> (in Japanese)

# News

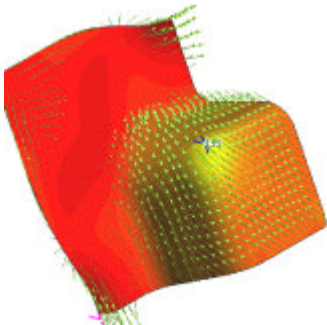


Covering surface of scanned points

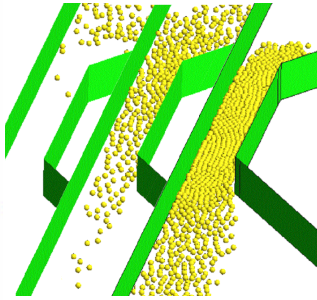
## GiD Version 7 available

### New features:

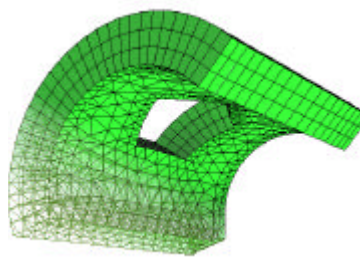
- Importation of ACIS 5.0 files
- 2D/3D boolean operations
- Parametric curves
- Boundary mesh creation
- Size assignment using a 'background' mesh
- Mesh smoothing options
- 3D labels : Points, Distance, Angle, Text
- Contour text ranges
- Binary results format
- Not smoothed gauss points results are drawn as spheres
- JPG, PNG, TGA output
- Neutral Femap and Tecplot ASCII import
- Read/Save Views
- Results used as points radius
- New interface for NE/NASTRAN
- New help in HTML format
- 'On-Line' tutorials



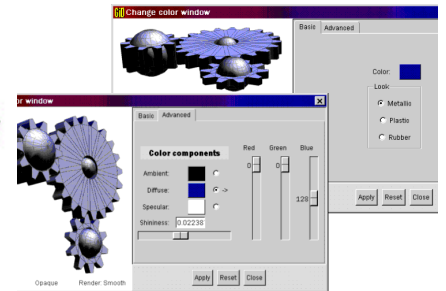
Several results at once



Meshless results visualization



Mesh extrusion



Easy colour selection



First release of **GiD on Mac OS X**. Requirements:

- Mac OS X 10.2.1 (check <http://www.apple.com/macosx> for updates)
- X11 window system (Apple: <http://www.apple.com/macosx/x11> or XDarwin: <http://www.xdarwin.org>)

## GiD Conference

**With great expectations we are preparing the 2nd Conference on Advances and Applications of GiD, which will take place in Barcelona on 18th - 20th February 2004.**

The objective of the meeting is to bring together users and developers of the GiD pre/post processing system and other people interested in mesh generation, computer data simulation and graphic visualization of numerical results in order to exchange experiences and views in this field.

On the 20th - 22nd February 2002, took place the 1st Conference on Advances and Applications of GiD at CIMNE, Barcelona. The day before the conference, a GiD course was presented explaining the most relevant aspects of the GiD features. New tutorial material for beginners and advanced GiD users was

presented. This material can be downloaded from:  
[http://www.gidhome.com/2002/material\\_courses.subst](http://www.gidhome.com/2002/material_courses.subst)

The conference was also a complete success at different dissemination levels: from beginners interested in a first introduction to simulation programs to advanced GiD users with specific problems such as customisation requirements or geometry handling.

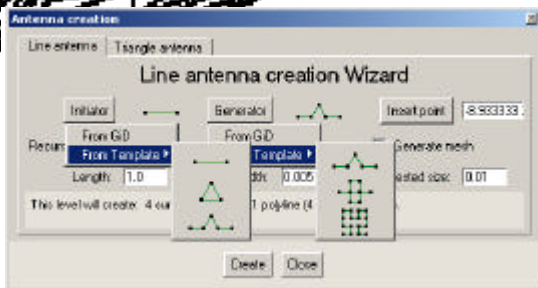
There were a total of 23-presented papers and 4 invited sessions, including applications in telecommunications or food technologies, new simulation trends like meshless methods or advanced interfaces like PC-FEAP, SAP2000, Codebright among others. The invited session were given by Rainald Lohner, Joaquim Peiro, Pere Brunet and Victor Gonzalez.

A complete list of the presented papers can be found in this page:  
<http://www.gidhome.com/2002/papers.subst>

# Applications

GiD Applications

## Fractalcoms\* Exploring the limits of Fractal Electrodynamics for the future telecommunication technologies



Thin wire, planar-strip, antenna creation window for GiD

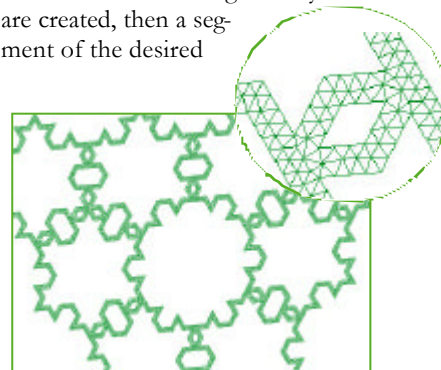
The aim of this FET\*\* project is basic research on fractal electrodynamics in order to explore the performance limits (both fundamental and technological) of highly innovative fractal shaped miniature devices for future wireless telecommunication systems. Classical antennas are highly sensitive to size in terms of the wavelength. The possibility of creating fractal multiband antennae, using the self-similarity property of fractal shapes, has successfully been demonstrated.

In addition, classical antennas cannot be made arbitrarily small. The fractal shapes may lead to a significant size reduction: the fractal dimension. In practice, a fractal shaped device can be made arbitrarily long until the technological limit is reached. Therefore, these new devices can be designed to accomplish the fundamental limit, which establishes the smallest size of a device for a given operating bandwidth, much better than Euclidean ones.

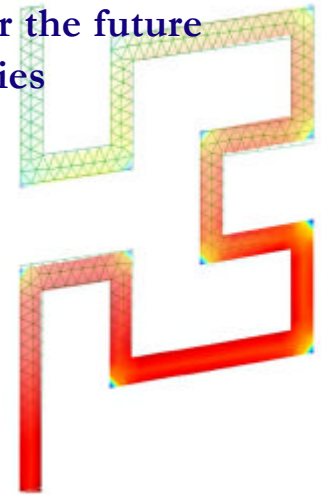
An important research has to be done rela-

ting the loss of efficiency, due to the concentration of currents and electromagnetic fields into very small regions, with the consequent gain reduction of these antennae, or increasing the insertion losses for microwave filters and resonators. Many prototypes have to be designed and checked to find the best topologies and parameters.

GiD is used in this project to create a powerful tool to generate the complex geometry and mesh of thin wire, planar-strip, fractal antennae and planar-surface antennae. This complexity does not only reside in the recursive creation of the fractal itself, but also in the definition of the width of the planar strip. Once the lines that define the fractal geometry are created, then a segment of the desired



3rd iteration of a Sierpinski triangle whose Initiator, basic cell, was a 2nd generation Koch island (a triangle with the Koch line fractals as sides)



2nd generation Hilbert fractal monopole (8.98 cm height and a strip 0.5 cm width). Current density for an analysis done at 290 MHz.

strip-width is extruded (using the 'Sweep' copy option) along the whole fractal. With a high level of recursion, more than a thousand surfaces, together with a big width for the strip, this will result in intersections and collapsing of surfaces.

\* Fractalcoms - Project funded by the European Community under the "Information Society Technologies" Programme (IST-2001-33055)

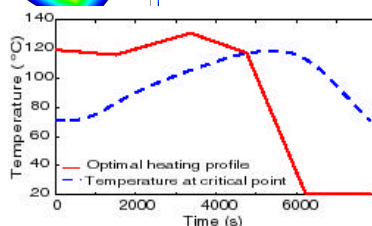
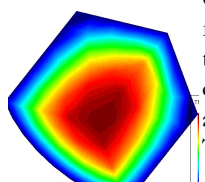
\*\* Future & Emerging Technologies is the IST programme nursery of novel and emerging scientific ideas. <http://www.tsc.upc.es/fractalcoms/>

### Contribution:

José M. González-Arbesù, Juan M. Rius at the Signal and Communications Theory dept. (UPC) <http://www-tsc.upc.es/ee/>

Miguel A. Pasenau Riera at CIMNE

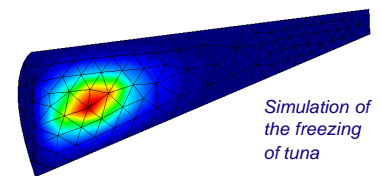
## Food Technologies simulation, optimisation and control of food processing



Simulation and dynamic optimisation of an sterilisation process

Competitiveness in the food sector is driven by the need to offer high quality products with adequate shelf lives. Therefore, many

research efforts are devoted to develop new preservation techniques and to improve the traditional ones to ensure a longer shelf life of food products. In this regard, the use of adequate modelling, simulation, optimisation and control tools is crucial. Advanced computer aided techniques can be effectively used to: model and simulate physical treatments and their biological effect on foods (death of micro organisms...), select the most suitable operating conditions to guarantee a safe product with the maximum possible nutritional content, control that the plant operates as closely as possible to those optimal operating conditions.



Simulation of the freezing of tuna

A new software package is being developed for the simulation, optimisation and control, of the most relevant food preservation techniques. This novel tool will provide an easy to use environment, based on GiD, with suitable numerical methods, which will allow food industries to improve their specific processes in an effective way.

Contributors: C. Maggiolo<sup>1</sup>, M. Chiumentì<sup>1</sup>, M. Cervera<sup>1</sup>, E. Balsa-Canto<sup>1</sup>, M. Rodríguez<sup>2</sup>, S. García<sup>2</sup>, A. A. Alonso<sup>2</sup>, J. R. Banga<sup>2</sup>

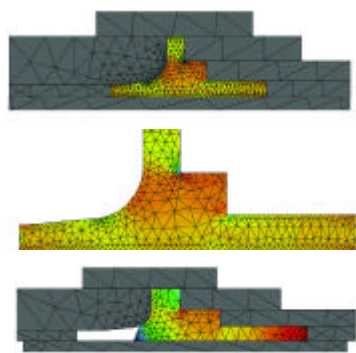
<sup>1</sup> CIMNE, <sup>2</sup> IIM-CSIC



# Applications

## PowCom:

### Powder Compaction for Metallurgy



Uniaxial compaction processes play a fundamental role in powder metallurgy and structural ceramics manufacturing. The main goal of the process is to obtain a density distribution as uniform as possible in order to avoid cracks during the subsequent manufacturing phases. Design of a com-

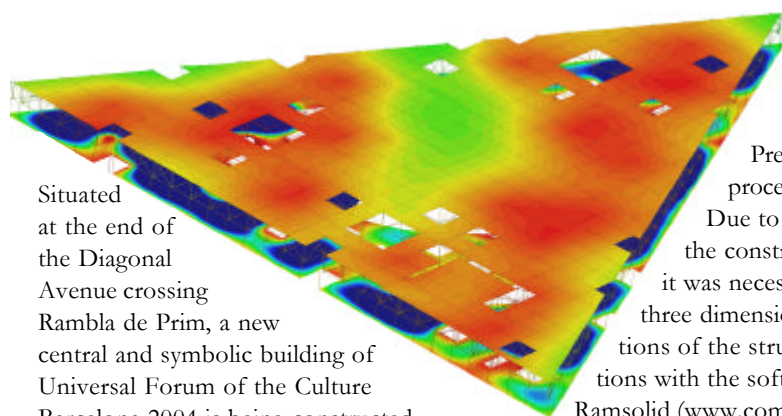
paction process consists, essentially, in determining the sequence and relative displacements of die and punches in order to achieve that goal.

PowCom is a finite element code specifically designed to be used as a computer aided design tool helping the user to take decisions to improve a given compaction process. In order to make it user-friendly, pre and post processing facilities are provided by GiD. Due to the large deformations occurring during the compaction phases, the mesh used (in a total Lagrangian description) is subjected to strong distortions, which lead to many numerical problems. GiD can be used also to solve this complex problem. GiD and PowCom are coupled in such a way that a distorted mesh is replaced by a new undistorted one and all of the calculated data is transferred from the old mesh to the new one.



**Contribution:** Juan Carlos Cante, Professor at the Department of Material Resistance and Structures of the ETSECCPB, UPC.

## FORUM 2004 Building



Situated at the end of the Diagonal Avenue crossing Rambla de Prim, a new central and symbolic building of Universal Forum of the Culture Barcelona 2004 is being constructed.

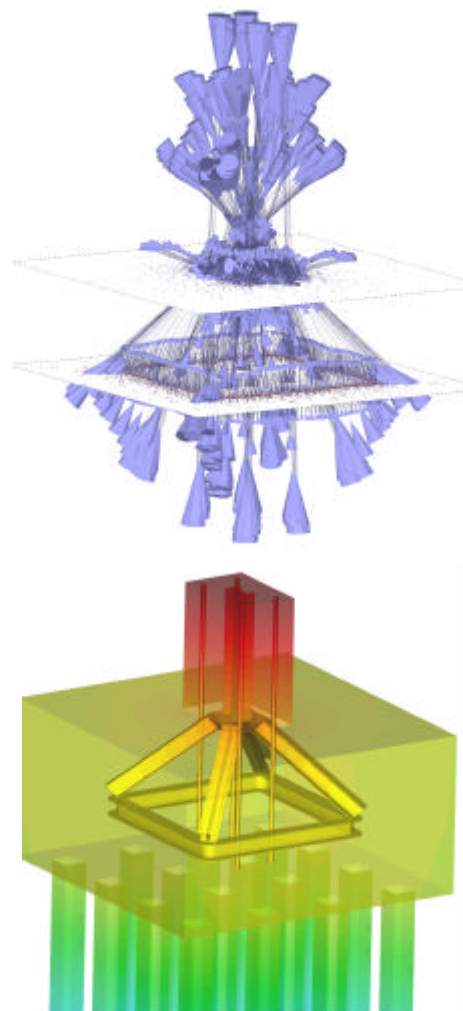
The 25 metres high construction has a triangular form of 180 metres per side. Metal roof structures (macro structure with 4.2 metres edge) lean on only 17 columns supporting a mezzanine of the exhibitions floor (micro structure with 1.1 meters edge) with the facade and interior hangers.

The extreme complexity of the geometry and the building magnitude, deed of the prestigious Swiss architects Herzog & De Meuron, required the utilization of Rambshell, the potent tool for the structural analysis which uses GiD as a

Pre/Post process.

Due to the large sizes of the construction elements, it was necessary to make three dimensional solid calculations of the structure foundations with the software code Ramsolid ([www.compassis.com](http://www.compassis.com)), integrated within GiD. By doing so, it was possible to simulate the structural behaviour of the reinforced concrete set in three dimensions. Concrete and metal parts could be analysed without any geometry simplifications, in a different number of forms and profiles for a comparative study, which permitted us to see the real forces applied to materials with great precision, and thus brought us the possibility to optimise their forms and selection.

Contribution: Lara Pellegrini, Study carried out at R. Brufau i Associats, Barcelona, Spain



# Interview

## GiD pioneers

Ramon Ribó<sup>1</sup> (RR),  
Miguel Pasenau<sup>2</sup> (MP)  
and Eugenio Oñate<sup>2</sup> (EO)



Ramon Ribó, Eugenio Oñate and Miguel Pasenau

**GT (GiD Times):** When were the first GiD lines of code written? How did it all start?

**EO:** It all started in "1984 when we faced the need of a versatile post-processing system for a project with Dassault Aviation dealing with the aerodynamic analysis of the HERMES shuttle during its re-entry in the atmosphere. This post-processing system named FLAVIA was developed by Dr. Gabriel Bugea from UPC/CIMNE using the PHIGS standard. Later on Miguel Pasenau translated FLAVIA into C and this turned to be the future kernel of the post-processor module of GiD.

**RR:** GiD as a pre-processor started around 1995. Later we joined it with the already mentioned Post-Processor. In that moment, there was no software available in the market that could solve the needs of CIMNE research people. One important priority was to merge the needs of different subjects like structural mechanics, CFD or electromagnetic. This helped us since the beginning to make a design that was application neutral and easy to customize.

**GT:** What has been an inspiration for you in creating this application?

**MP:** The inspiration was to solve the usual problems of the research groups at CIMNE: too many complex and expensive programs to prepare a geometry, to mesh models, to view results and the need to create and use interface programs between them. The enthusiasms and prompt feedback of the users, expanding their horizons help us a lot.

**EO:** FLAVIA, when it existed alone, became very popular at CIMNE and UPC. Dr. Ramon Ribó came into scene and started his Ph.D. work, a versatile pre-processing module. Together with Miguel Pasenau they were the first members of the GiD Development Team. Later on came Kike Escolano, Jorge Suit and Victor Bayarri to complete the current team.

**GT:** When did you first get the idea of making GiD a professional product?

**EO:** After GiD became an everyday tool for CIMNE researchers; we soon realized that GiD was also useful for any other scientists and developers world-wide, with frequent requests to distribute GiD around the world. The step towards a professional distribution of GiD was obvious.

**MP:** As we were creating this program with its installer and its web page, by the end of 1996, it began to be a 'product' that people were able to download and experience with it. The increasing demand for a product of this kind led us to launch the 1st Public and Official version of GiD in July 10th, 1997 at the UPC in Barcelona. It was GiD 3.0 and filled two 3 1/2" diskettes.

**GT:** Where is the position of GiD on the market between pre/postprocess codes?

**EO:** Versatility, user-friendly adaptability and affordable price are the main goals of GiD. I believe these features distinguish GiD from the rest of existing pre/post processing systems.

**MP:** GiD is an entry stage in the simulation world for teachers and students. Besides this, it is a generator of new products. A computational code with GiD is also a 'ready-to-sell' package.

**GT:** What kind of role does development of GiD plays in CIMNE and how many people develop it?

**EO:** The kernel of the GiD Development Team is formed by 5 engineers and scientists.

**MP:** The flexibility of GiD brings a lot of opportunities to investigate new technological tendencies in simulation like meshless methods or simulation in GIS (Geographic Information Systems) systems.

**GT:** What kind of relation do you maintain between Compass, as the commercial partner of GiD and CIMNE? Is there some development done in Compass?

**RR:** The CIMNE main objectives are the research but not to develop a sales & marketing division. Compass, a CIMNE start-up, has as priority the promotion and international marketing of GiD. Another activity of Compass is to provide customized solutions

based on GiD for high demanding costumers.

**EO:** COMPASS is the official distributor of GiD at corporate level. COMPASS looks for agreements with companies and organisations worldwide interested in distributing GiD in different world regions and/or integrating it with their own software packages. GiD is closely supervised by COMPASS. Dr. Ramon Ribó, Director of COMPASS, is the coordinator of the GiD development work.

**GT:** What's the most interesting idea, inside or outside of your specific industry that you've heard recently?

**RR:** Computer simulation carries an associated high cost: learning time and error control. Software programs in this area will have to incorporate in the future several technologies, based on AI (Artificial Intelligence) and computer auto-learning.

**EO:** There is a great future in developing Decision Support Systems (DSS) where computer codes will be a part of a larger system containing data acquisition modules, data processing tools, simulation programs, graphic visualizers, artificial intelligent modules and, possibly, mechanical actuators. Typical examples of these developments in CIMNE are DSS for managing risk scenarios during floods, for urban planning and for enhanced manufacturing processes. Indeed GiD will play an important role in the new DSS as a kernel for data generation and for transfer and visualization of input and output numerical information.

### <sup>1</sup>Compass:

Compass is a company specialized in development of numerical analysis software and engineering consultancy, both based on Finite Elements Method. Members of Compass team are highly qualified professionals actively operating in number of engineering fields including civil, industrial and naval.

Compass is an organization with capacities of a large scale. Big industrial companies, as well as specialized teams acting for example in the America's Cup use the software and services of Compass to achieve their goals. COMPASS closely cooperates with a wide network of technology research centres and technically oriented companies, which allows offering the most innovative technology solutions.

<http://www.compassis.com>

### <sup>2</sup>CIMNE

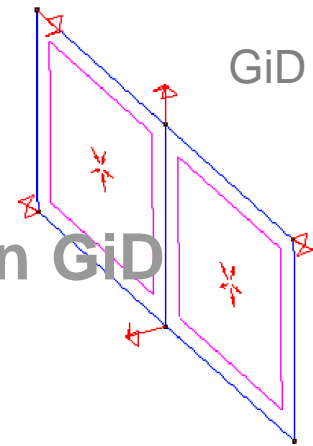
The International Center for Numerical Methods in Engineering is an autonomous research and development center dedicated to promoting and fostering advances in the development and application of numerical methods and computational techniques for the solution of engineering problems in an international context.

<http://www.cimne.com>

# Tips



## Using Symbols in GiD



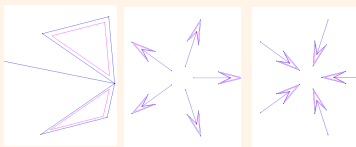
The different conditions in GiD are visualised using their names, colours or symbols. The first two possibilities provide enough information to handle the conditions in most of the cases, but when a lot of them are used or a faster and global visualisation is required, then the use of symbols becomes necessary. This tip shows how to do it, by just following these steps:

- 1) Create a new problem type called SYMB, i.e., create a subdirectory called SYMB.gid in the problemtypes GiD subdirectory.
- 2) Create a file called SYMB.cnd which holds the required conditions to use, with the following text ( text area on the right)
- 3) Create the symbols with GiD: open a new project in GiD, execute each list of commands and save the geometry with the respective name (the three text areas below):

```
NUMBER: 1 CONDITION: symbol3d
CONDTYPE: over points
CONDMESHTYPE: over nodes
QUESTION: X_Component
VALUE: 0.0
QUESTION: Y_Component
VALUE: 0.0
QUESTION: Z_Component
VALUE: 0.0
END CONDITION
NUMBER: 2 CONDITION: symbol2d
CONDTYPE: over surfaces
CONDMESHTYPE: over body elements
QUESTION: element_value
VALUE: 0.0
END CONDITION
```

### symb3d.gid:

```
Geometry Create Point
0,0,0 5,0,0 4,1,1
4,-1,1 4,1,-1 4,-1,-1
escape Create Line
Join 1 2 5 3 2 6 4 2
escape escape escape escape
geometry create NurbsSurface
Automatic 3
escape escape escape escape
```



### symb2din.gid:

```
Geometry Create Point
1,0,0 4,0,0 5,0,0
3,0.5,0 3,-0.5,0
escape Create Line
Join 1 2 4 3 5 2
escape escape escape escape
geometry create NurbsSurface
1 2 3 4 5 1
escape escape escape escape
utilities Copy Surfaces
MCopy 5 Rotation
FNoJoin 0.0,0.0,0.0
TwoDim 72 1
escape escape escape escape
utilities Copy Lines
MCopy 5 Rotation
FNoJoin 0.0,0.0,0.0
TwoDim 72 1
escape escape escape escape
```

### symb2dout.gid:

```
Geometry Create Point
1,0,0 2,0,0 5,0,0
3,0.5,0 3,-0.5,0
escape Create Line
Join 3 2 4 1 5 2
escape escape escape escape
geometry create NurbsSurface
1 2 3 4 5 1
escape escape escape escape
utilities Copy Surfaces
MCopy 5 Rotation
FNoJoin 0.0,0.0,0.0
TwoDim 72 1
escape escape escape escape
utilities Copy Lines
MCopy 5 Rotation
FNoJoin 0.0,0.0,0.0
TwoDim 72 1
escape escape escape escape
```

- 4) Create a directory called symbols in the SYMB.gid subdirectory and copy inside the three .geo files (symb3d.geo, symb2din.geo and symb2dout.geo) which are in their respective .gid project directories.

```
cond symbol3d
1
global
cond(1,real)
cond(2,real)
cond(3,real)
symbols/symb3d.geo
cond symbol2d
2globalcond(1,real)>0
1
0
0
symbols/symb2din.ge
global
cond(1,real)<0
1
0
0
symbols/symb2dout.geo
```

- 5) Create in the SYMB.gid directory a file called SYMB.sim which will associate the conditions with their respective symbols and which tells GiD how to draw them. Use the following text:

### .sim File Structure

```
cond name_condition
number_of_figures
global/local
true/false (draw)
orientation_x
orientation_y
orientation_z
file_of_symbol.geo
```

Now you can graphically visualise your conditions.

Javier Mora and Miguel A. Pasenau

More information: GiD web page (support section, Tutorials), <http://www.gidhome.com/support/su05.subst>

## Links:

### Codes availables under the GNU General Public License



Impact is a **Finite Element Code** based on an Explicit Time stepping algorithm (dynamic phenomenon such as car crash, often involving large deformations).

<http://impact.sourceforge.net/>



Explicit and implicit **Finite Element Program** with linear, non-linear, elastic, hyper elastic, hypo elastic, plastic, viscous, contact, thermal and fluid capabilities with h/p refinements.

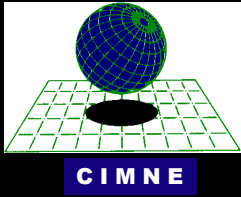
<http://tochnog.sourceforge.net/>



Methodology and Computing Structure to Build **Finite Element Programs**: an open source framework with object-oriented structure for multi-physics problems.

<http://www.cimne.upc.es/kratos>





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Fax: 34 93 401.65.17  
e.mail: [cimne@cimne.upc.es](mailto:cimne@cimne.upc.es)  
Web page: <http://www.cimne.com>

## GiD Times

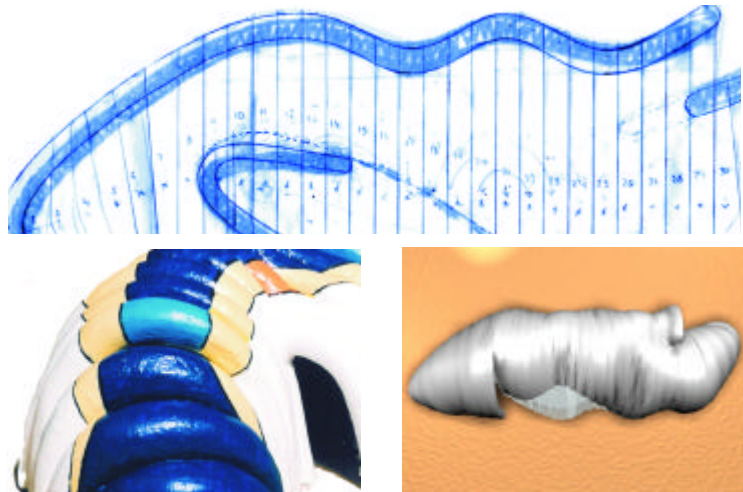
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Javier Mora  
Adriana Hanganu

### director

Eugenio Oñate

# Issue's Photo

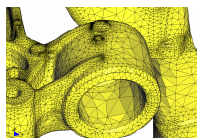
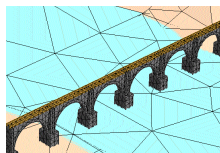
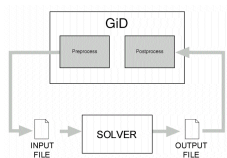


### Gaudi Institute pavilion (2002)

Inflatable pavilion inspired in the famous Catalan architect Gaudi (28 meters long, 12 meters width, 9 meters elevation of 9 meters. Total cover surface 250 m<sup>2</sup>). Designed using GiD.

*Courtesy of* Build Air Inflatable Structures  
[info@buildair.com](mailto:info@buildair.com)  
[www.buildair.com](http://www.buildair.com)

## GiD Tutorials



VRML Problem Type

Basic Modelling

Advanced Mesh Generation

Advanced Post process

Tcl Tk extension

All these tutorials are available in the GiD web page: <http://www.gidhome.com/support/index.html>

GiD builds a strong **Partners Network** closing agreements with market leaders that increase their market share by becoming GiD Resellers. Besides number of GiD Partners integrating their own calculation modules with GiD and re-selling GiD licenses to their clients, the following four companies are the main **GiD Resellers**:

**Magsoft Corporation - USA**  
<http://www.gid-usa.com>

**Digital Solutions Inc. - Japan**  
<http://www.cadcamcae.net>

**MAXSOFT - India**  
<http://www.maxsoft-india.com>

**Nautatec Chile Ltda. - Chile**  
<http://www.nautatec.com>