CIMNE
1987 - 2016

Short description

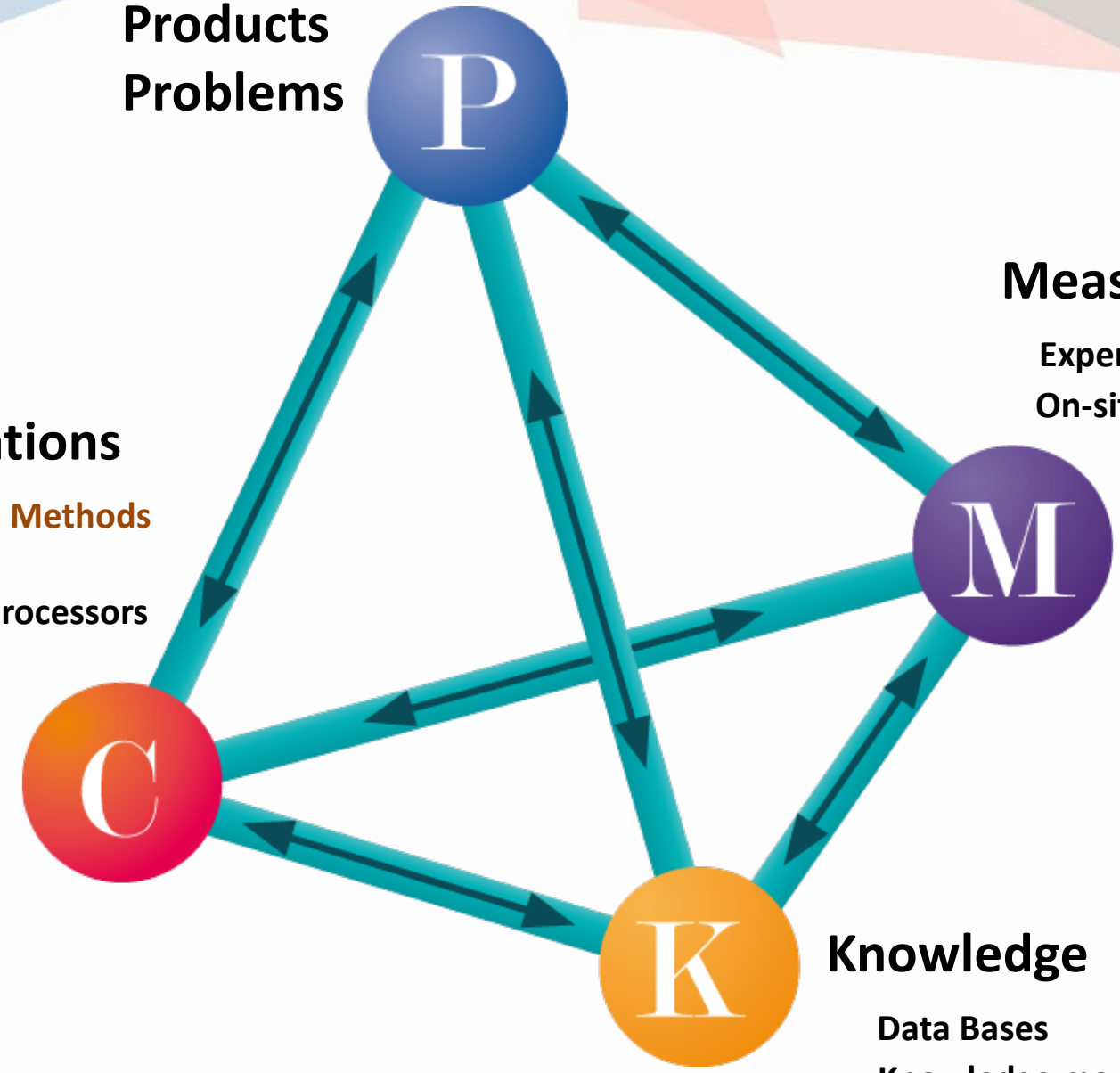
WHAT IS CIMNE?

The International Center for Numerical Methods in Engineering (CIMNE) was created in 1987.

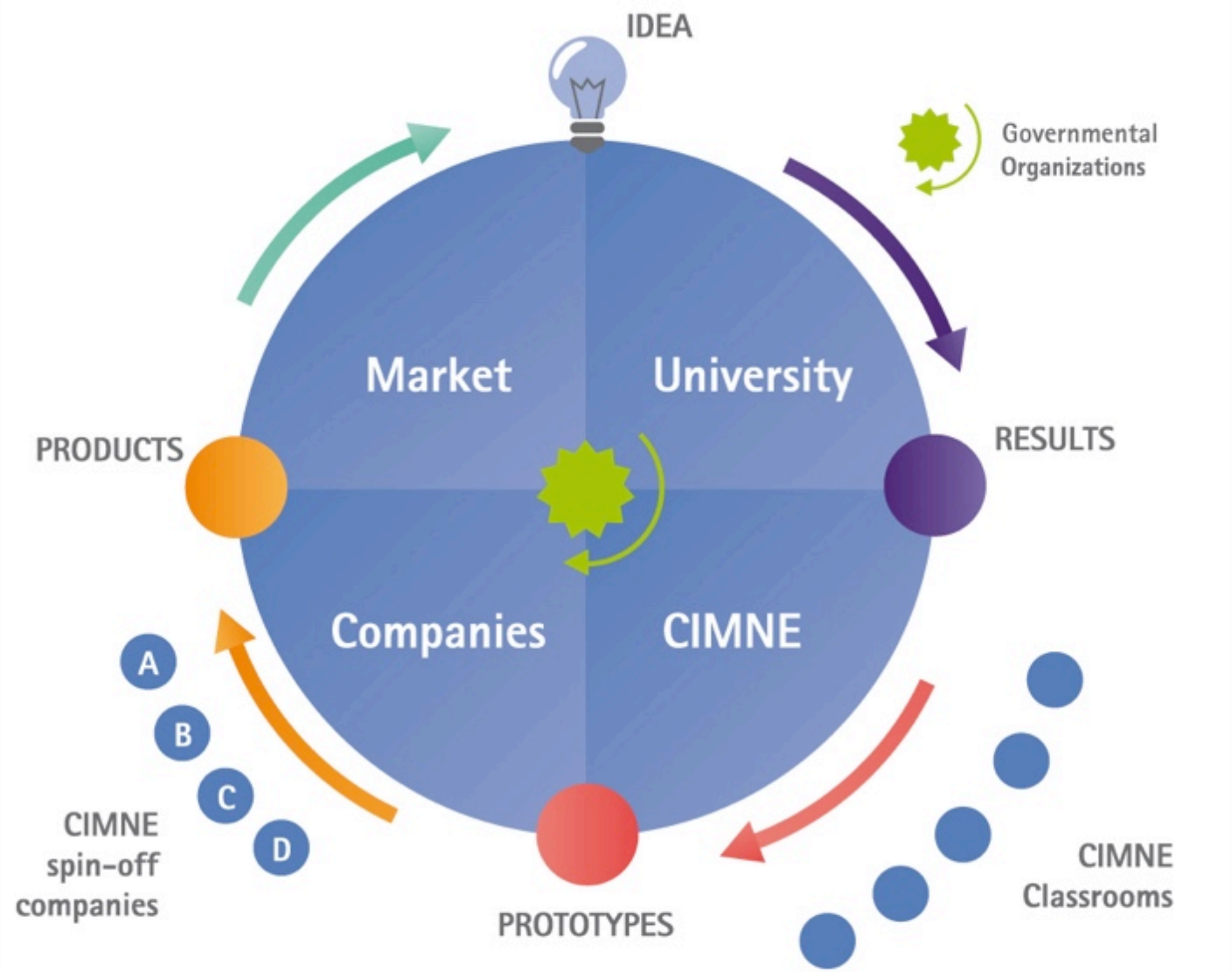
Its mission is the development and dissemination of original research in the field of numerical methods in engineering (NME), the education of researchers in that field and the transfer of the research outputs to industry.

NME is the discipline that provides the scientific basis for the computer analysis of all engineered systems. Researchers at CIMNE require outstanding skills on mathematical modelling, engineering concepts, numerical algorithms and programming.

Holistic vision of CIMNE activities



Cycle of ideas at CIMNE



Organisation Chart

GOVERNING COUNCIL
President: J. Baiget

EXECUTIVE COUNCIL
President: E. Oñate

ADVISORY SCIENTIFIC COUNCIL
Chairman: R. Owen

DIRECTOR
E. Oñate

GENERAL MANAGER
A. Font

RESEARCH AND TECH. DEVELOPMENT

RTD AREAS AND GROUPS

BIO-MEDICAL ENGINEERING AREA

Biomechanics Group
Leaders - M. Cerrolaza and E. Soudah

CIVIL ENGINEERING AREA

Fluid Mechanics Group
Leader - R.Codina

Geomechanics Group
Leaders - E. Alonso and A. Gens

Industrial Processes Group
Leaders - M. Chiumenti and O. Fruitós

Structural Mechanics Group
Leader - E. Oñate

TRANSPORT AREA

Aerospace Engineering Group
Leader - J. Pons

Naval and Marine Engineering Group
Leader - J. García

COMPUTATIONAL AND INFORMATION TECH. AREA

Information and Technology Group
Leader - J. Jiménez

Large-Scale Scientific Computing Group
Leader - S. Badia

Mathematical and Computational Modelling Group
Leader - A. Huerta

Pre and Post-Processing Group
Leader - A. Coll

ENERGY AND ENVIRONMENT AREA

Building, Energy and Environmental Group
Leader - J. Cipriano

Nature Group
Leader - P. Arnau

Risk Assessment Group
Leader - A. Barbat

ADMINISTRATION

ACCOUNTANCY and FINANCES
Leader -M.C. Linares

PROJECT MANAGEMENT
Leader - S. Pérez

CONGRESS BUREAU
Leader - C. Forace

POST-GRADUATE TRAINING
Leader - L. Zielonka

SYSTEMS
Leader - M. Alonso

PUBLICATIONS and COMMUNICATION
Leader - M.J. Samper

LEGAL
Leader - R. Casanova

HUMAN RESOURCES
Leader - M. Linares

CIMNE

Personnel

CIMNE has evolved since 1087 to become a prestigious international research center on NME

STAFF / POSITION TITLE	2015
Management staff	**2**
Administration staff	**35**
Research staff	**84**
Full Research Professors	25
Associate Research Professors	13
Assistant Research Professors	12
Post Docs	24
Staff Scientists	8
Visiting Scientists	2
Research Engineers	**49**
Research Students	**75**
PhD Students	53
Master Students	19
Ungraduate Students	3
TOTAL Staff	**245**

25 researchers of CIMNE
(most of them in the upper research categories)
are faculty of the
Technical University of Catalonia (UPC).

The affiliated researchers
play an important role as liaison between
the research carried out in NME
at CIMNE and UPC.

Research at CIMNE

Research Lines

- Algorithms for Multiphysics Problems
- Computational Fluid Dynamics
- Computational Geomechanics
- Mathematical and Computational Modeling
- Computational Modelling of Engineering Materials
- Computational Solid and Structural Mechanics
- Optimization
- Computation and Information Technologies
- Numerical Methods and Technologies for Energy and Environment

Research Areas & RTD Groups

Civil and Mechanical Engineering Area

- Fluid Mechanics Group
- Geomechanics Group
- Industrial Forming Processes Group
- Structural Mechanics Group

Energy and Environment Area

- Building, Energy and Environmental Group
- Nature Group
- Risk Analysis Group

Bio-Medical Engineering Area

- Biomechanics Group

Computational and Information Technologies Area

- Information and Communication Technology Group
- Large-scale Scientific Computing Group
- Mathematical and Computational Modelling Group
- Pre and Post-Processing

Transport Area

- Aerospace Engineering Group
- Naval and Marine Engineering Group

http://www.cimne.com/vpage/2/0/Research/Research-lines-areas-groups

CIMNE

Research Groups at CIMNE

Researchers at CIMNE carry out their activity within research and technical development (RTD) Groups managed by a Group Leader.

The research activities are coordinated by one or more Principal Investigators (PIs).

CIMNE, RTD Groups are gathered in RTD Areas that target fields such as civil and mechanical engineering, transport, energy and environment, ICT and biomedical engineering, and others.

Research Lines at CIMNE

Research lines at CIMNE are focused on the development of numerical methods of interest to:

- Structural mechanics,
- Geomechanics,
- Fluid dynamics,
- Design of materials,
- Biomechanics
- Multi-physics processes
- Other scientific disciplines of interest to engineering (i.e optimization, etc.)

Applications include problems in civil, mechanical, aeronautics, naval/marine, bio-medical, energy and environmental engineering, among other fields.

CIMNE is ranked in the 18th position on a list of 528 research centers in Spain in terms of production and scientific activities.

In the world ranking, CIMNE is in the 395th position in a list of 7,353 research centers worldwide.

In terms of number of papers and citations for each academic domain, CIMNE is positioned at number 98 in the world. This classification is based on the database of Google Scholar Citations (GSC).

In January 2016, *Webometrics* has published a list of the most cited Spanish scientists. The study, based on citations from *Google Scholar*, includes 29 researchers of CIMNE among the 10,000 most cited scientists of Spain.

Research Projects at CIMNE

Since 1987 CIMNE researchers have taken part in 223 RTD projects (including 8 projects supported by the European Research Council) in cooperation with 500 scientific organizations and 1000 companies worldwide.

EUROPEAN COMPETITIVE PROJECTS (2000-2016)	
FP4 (1994-1998)	21
FP5 (1998-2002)	41
FP6 (2002-2006)	28
FP7 (2007-2013)	52
CIP (2007-2013)	6
H2020 (2014-2020)	14
TEN-T (2007-2013)	7
CEF (2014-2020)	3
Others	27
TOTAL	**199**

Worldwide presence of CIMNE

Aulas CIMNE

Spain	**6**
Barcelona	3
Lleida	1
Madrid	1
Valladolid	1

Latin-America	**24**
Argentina	6
Brazil	3
Chile	1
Colombia	2
Cuba	2
El Salvador	1
Guatemala	1
Mexico	4
Perú	1
Venezuela	3

International Branches

- Spain
- USA
- Singapore
- Argentina
- China

CIMNE

Worldwide presence of CIMNE

- CIMNE has established **4 legal international branches**:

  - CIMNE Latin America (Santa Fe, Argentina);
  - CIMNE USA (Washington DC, USA);
  - CIMNE Singapore (Singapore)
  - CIMNE Beijing (China).

CIMNE has also set up an international network of Joint Labs (the Aulas CIMNE) with 30 members: 6 in Spain and 24 in Latin America. http://aulas.cimne.com/spacehome/3/0).

Dissemination and Training Activities

PUBLICATIONS

CIMNE researchers have published 550 JCR journal papers, 127 books, 45 monographs, 60 RTD reports and 642 Technical reports

INTERNATIONAL CONFERENCES

CIMNE has organized 173 international scientific conferences in the field of NME. 135 of these conferences have taken place in Spain, 33 conferences in different European countries and 5 conferences in America (1 in USA and 4 in different Latin American countries).

TRAINING ACTIVITIES

CIMNE manages two international MSc courses and one PhD program.
It organizes an average of 2 short courses and 23 seminars annually.
Its research staff has supervised a total of 75 PhDs (completed) and 424 MSc students.
53 students currently perform their PhD under supervision of CIMNE researchers.

Technology Transfer Activities

PATENTS

CIMNE has 6 patents (5 patents published in the period 2011-15)

CIMNE TECHNOLOGY-BASED COMPANIES

CIMNE has actively promoted the creation of , or participation in, technology –based companies with the goal of commercializing the products emanating from CIMNE research.

- In 2001-2011 CIMNE created 3 companies.
- In 2011-2016 CIMNE has created or participated in 12 companies.
- Most of these companies are managed by CIMNE Tecnologia S.A, a company created in 2011 and 100% owned by CIMNE (www.cimnetecnologia.com).

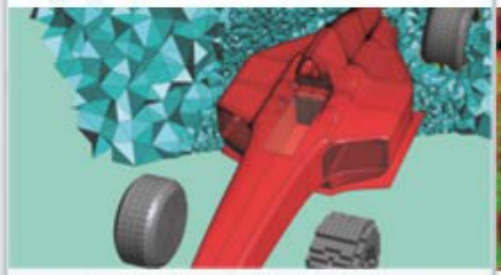
Products and companies

Products

Pre and Post Processing Software

GiD

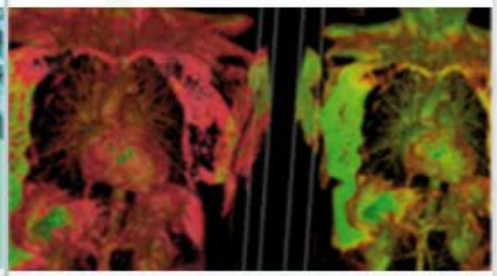
A universal and adaptive pre and postprocessor for computer simulation in engineering and applied science.



Developed and marketed by CIMNE since 1998

DIPPO

Versatile platform for digital image processing combined with numerical modeling and simulations.



Developed and marketed by CIMNE since 2011

Engineering Systems and Hardware

Inflatable Structures

Inflatable pavilions, shelters and bridges for applications in engineering and architecture.

Developed by BuildAir and CIMNE.
Marketed by BuildAir since 2002

OKO

Interactive frame for display images and videos.

Developed by CIMNE.
Marketed by Tecnologías Avanzadas para el Ocio, SL. since 2016.

WATER-PS

Fresh water production system.

FWN

Developed by CIMNE and Fresh Water Nature, Ltd.
Marketed by Fresh Water Nature, Ltd. since 2016.

Products

Collaborative Work Platforms

Mi colegio en red (MCR)

Communications system and integrated services designed specifically for schools via the Internet.

Developed and marketed by CIMNE since 2000.

Fraktalis

Fully customizable Web application that creates virtual communities where users can communicate and share.

Developed and marketed by CIMNE since 2009.

Lhings

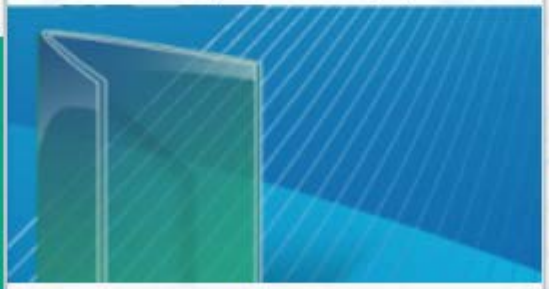
Cloud platform to provide access and links to all kind of things and let users management, share and interaction with them.

Lhings

Developed and marketed by Lyncos SL in cooperation with CIMNE.

SIGPRO

Integrated software platform for the management of the research and finantial activities and reports in RTD projects.

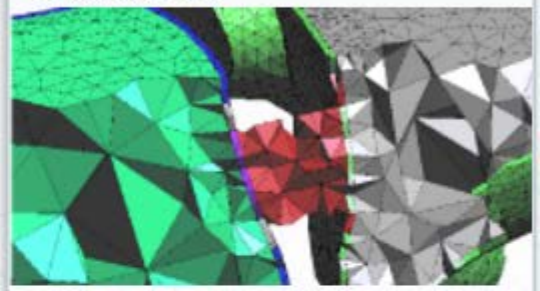


Developed by CIMNE.

Educational Software

Educational Software

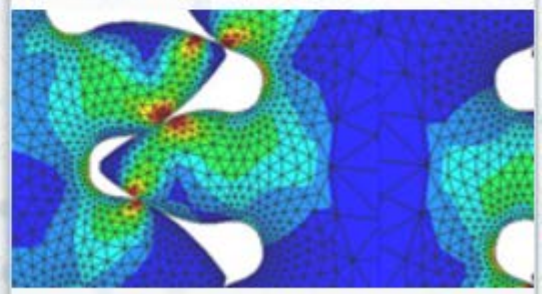
Educational software for interactive learning about structural design and finite element method.



This product is developed and marketed by CIMNE.

MAT-Fem

Educational program written in MATLAB for introduction to the finite element method for analysis of structures and field problems.



Developed by CIMNE.

Products

Decision Support Systems

Beaching

Information system for management of tourism activities in beach areas.

Developed by CIMNE and marketed by TAOC SA since 2011.

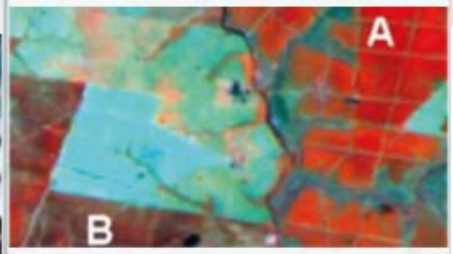
ROBOCOPT - RMOP

Interpolated platform for robust multiobjective optimization in engineering.

Developed by CIMNE.

GIS+

Web-based interactive Geographic Information System.



Developed by CIMNE.

SIE

Information system for management of energy consumption in public buildings and municipalities.

Developed by CIMNE. Marketed since 2005 by Gassó Auditores SL and CIMNE.

ROEM

Information system for assessment of the environmental quality in reservoirs and lakes.

Developed by CIMNE.

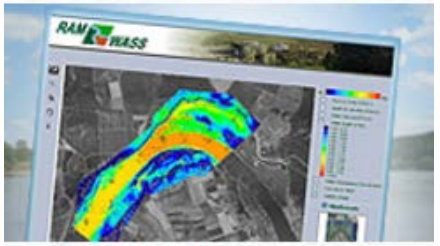
E-Testing

Web-based platform for e-management of experimental tests.

Developed by CIMNE and Applus.

RAMWASS

Decision support tool for the risk assessment and management of environmental and human-induced hazards on the water/sediment/soil system in fluvial ecosystems.



Developed by CIMNE.

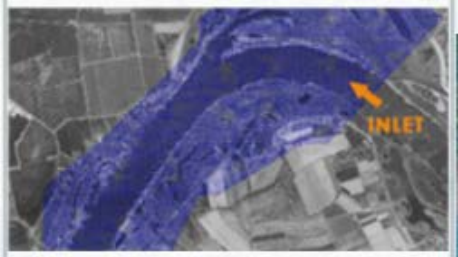
Flood

Artificial neuronal network package.

Developed by CIMNE.

RAMFLOOD

Decision support system (DSS) for risk assessment and managing of floods.



Developed by CIMNE and FLUMEN.

WSNP

An integrated platform for e-monitoring using wireless sensor network technology.

Developed by CIMNE

Products

Simulation Software for Manufacturing Processes

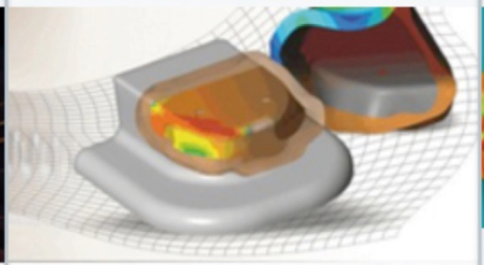
WeldPack

Welding processes.

Developed by CIMNE.

StamPack

Sheet metal forming processes.



Developed by Quantech ATZ, SA in cooperation with CIMNE. Marketed by Quantech ATZ, SA since 1999.

Click2cast

Fast simulation of casting processes.

Developed by Quantech ATZ in cooperation with CIMNE. Marketed by Altair since 2015.

SCUT

Cutting processes for the metal manufacturing industry.

Developed by CIMNE.

SAMPRO

Additive manufacturing processes.

Developed by CIMNE in cooperation with Eurecat.

FORGEPACK

Forging manufacturing processes.

Developed by CIMNE.

MACHPACK

Machining manufacturing processes.

Developed by CIMNE.

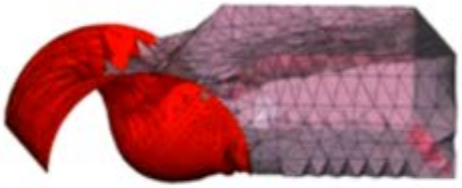
CIMNE

Products

Simulation Software for Multiphysics

KRATOS

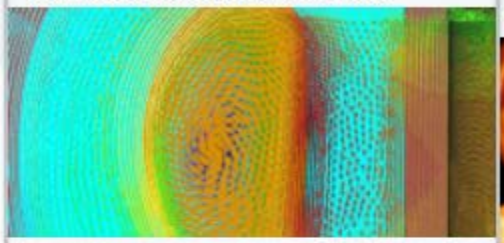
Object-oriented software platform for the development and application of finite element codes for multidisciplinary applications.



Developed by CIMNE.

ERMES

Computational electromagnetics using advanced finite element methods.



Developed by CIMNE.

PFIRE

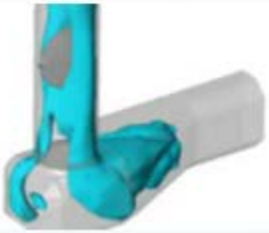
Analysis of propagation of fire and its effect on the burning and melting of objects.

Developed by CIMNE.

Simulation Software for Fluid Dynamics

TDYN

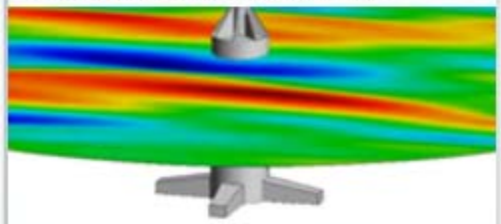
Finite element code for analysis of a wide range of multi-physic problems in engineering and applied science.



Developed by Compass Ingeniería y Sistemas, SA and CIMNE.
Marketed by Compass since 2003.

SeaFEM

Hydrodynamics and seakeeping analysis of ships and marine structures. App for wind tower generators in the sea.



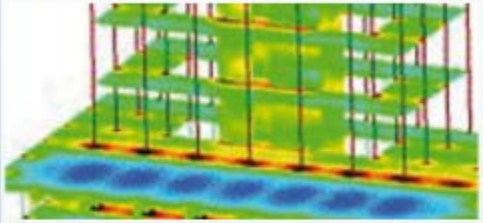
Developed by Compass Ingeniería y Sistemas, SA and CIMNE. Marketed by Compass since 2011.

Products

Simulation Software for Structural Engineering

RAMSERIES

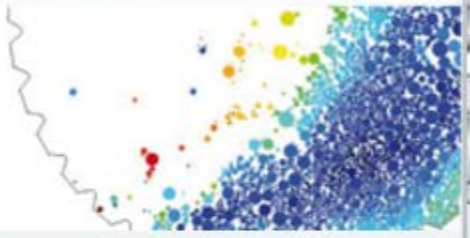
Finite element code for analysis of structures in engineering and architecture.



Developed by Compass Ingeniería y Sistemas, SA. and CIMNE.
Marketed by Compass since 2003.

DEMPACK

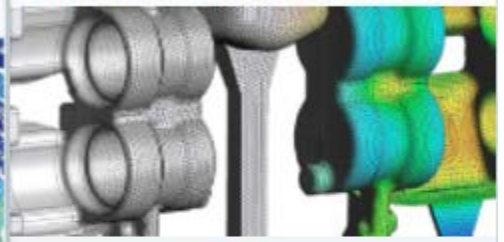
Analysis of granular systems and multifracturing problems in geomechanics and industrial processes using discrete and finite element methods.



Developed by CIMNE.

COMET

Finite element code for none linear analisys of thermomechanical problems in solid and structural mechanics acounting for frictional contact situations.



Developed by CIMNE.

Biomechanics & Health

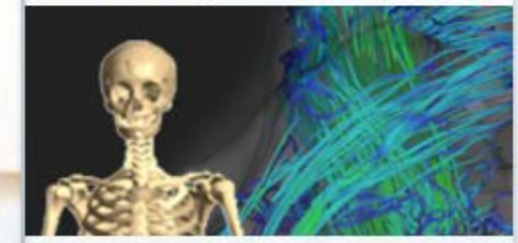
Health App

App to control eating disorders.

Developed by HealthApp in cooperation with CIMNE. Marketed by HealthApp S.L. since 2014.

BodyGiD

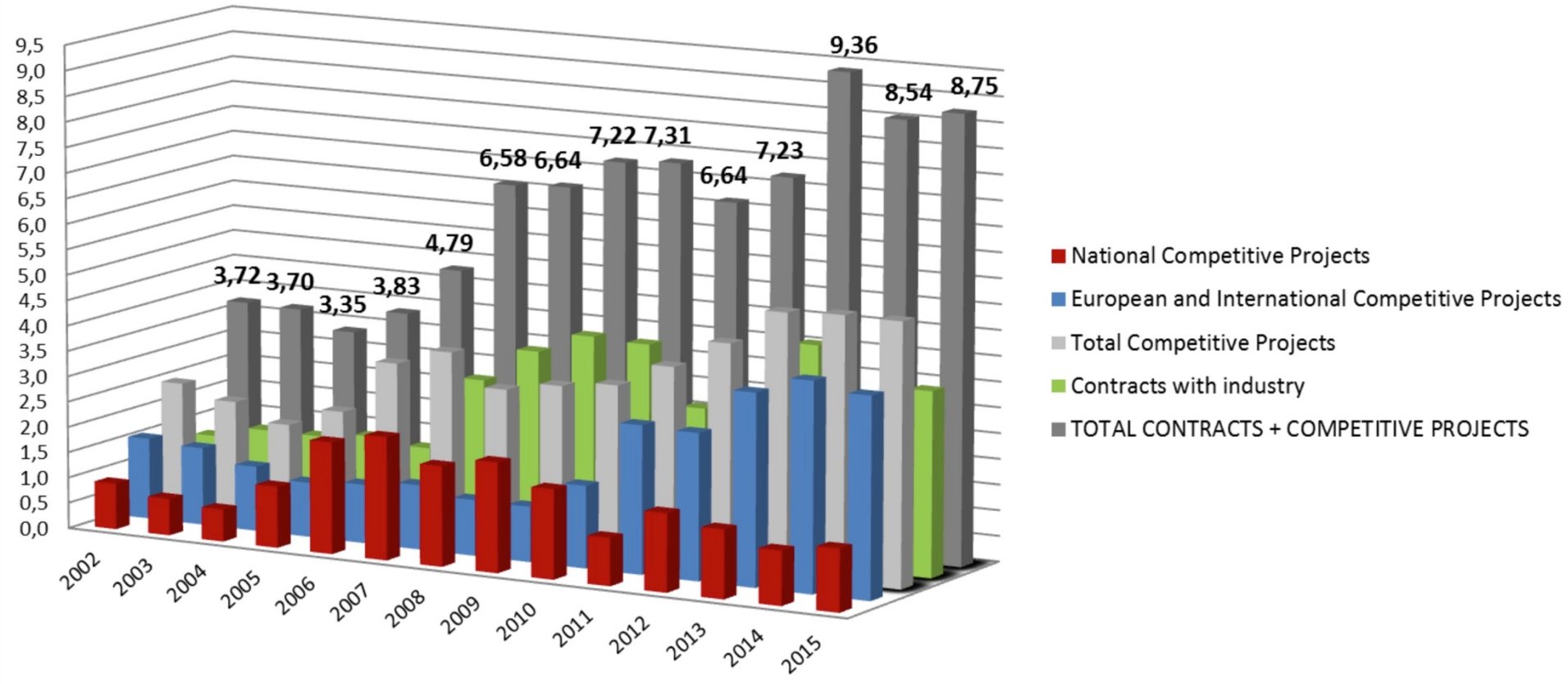
Multiscale representation and analysis of the human body.



Developed by CIMNE.

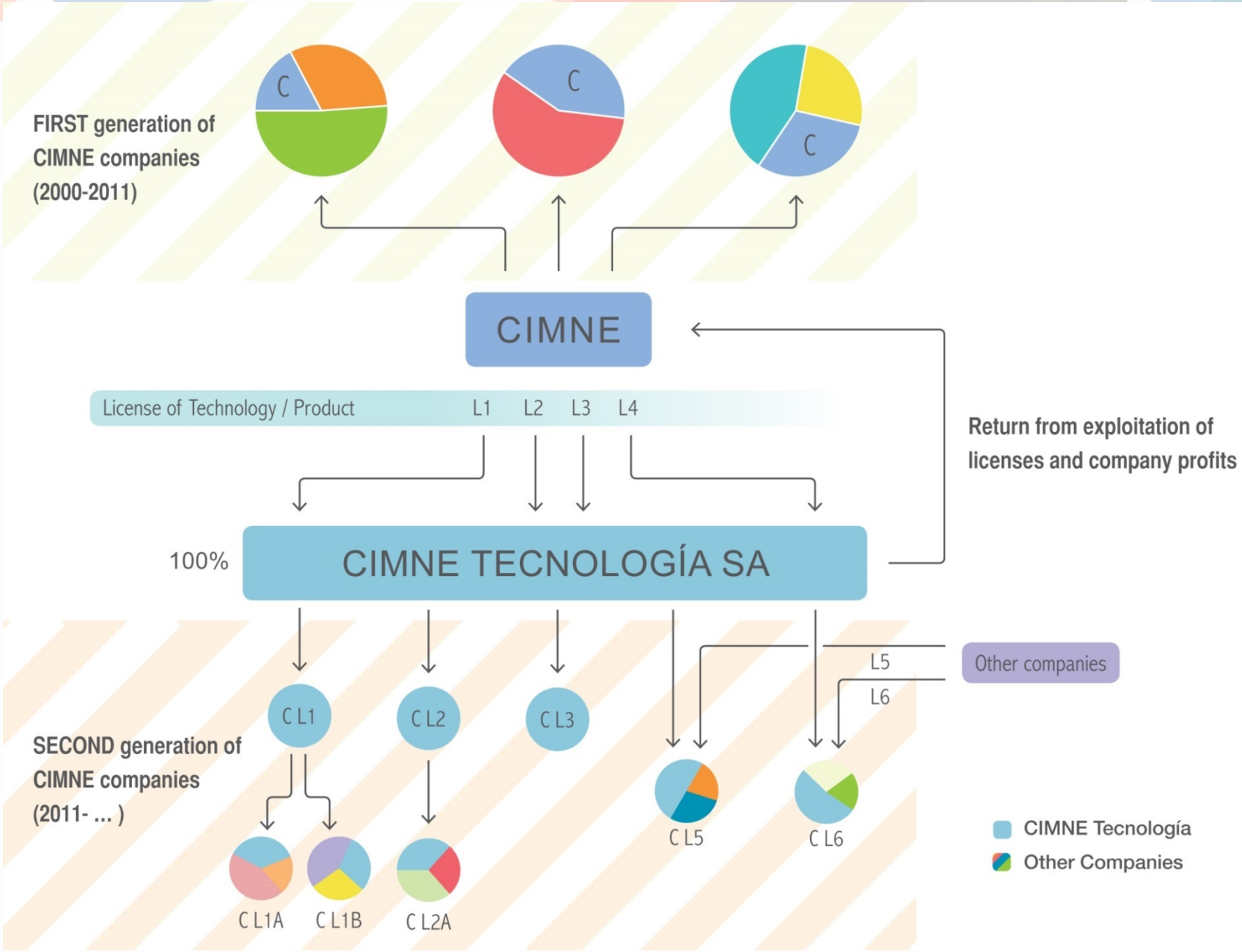
CIMNE

Annual income from RTD projects and contracts



CIMNE

Spin-off companies



CIMNE spin-off companies

SOLUCIONES INTEGRALES DE FORMACIÓN Y GESTIÓN STRUCTURALIA, SA
Created in 2001
structuralia.com
Training and consulting activities in the civil engineering via Internet. It was sold in 2011 to KAPLAN (The Washington Post Group).

COMPASS INGENIERÍA Y SISTEMAS, SA
Created in 2002
compassis.com
It develops commercial activities related to numerical methods in engineering, with emphasis on civil, naval and maritime engineering. CIMNE owns 24% of COMPASS.

INGENIA AIE
Created in 2006
EIG formed by several companies and CIMNE. The objective is to promote the participation of its members in projects of aeronautics and the space field, in cooperation with the main international manufacturers in the sector.

CIMNE TECNOLOGÍA, SA
Created in 2011
cimnetecnologia.com
Company 100% owned by CIMNE aiming to industrialize and market the products and technology developed at CIMNE. CIMNE Tecnología SA. is also an incubator and promoter of new companies.

BUILDAIR INGENIERÍA Y ARQUITECTURA, SA
Created in 2001
buildair.com
Development and marketing of inflatable structures for a wide range of applications in engineering and architecture. CIMNE Tecnología SA owns 5% of BUILDAIR.

BIOMECHANICS DEVELOPMENTS, SL
Created in 2015
bd-biomechanics.com
Biomechanics Developments is specialized on the development of software solutions and services in the biomedical field.
CIMNE Tecnología SA owns 50% of Biomechanics Developments.

INLOC ROBOTICS, SL
Created in 2014
inlocrobotics.com
The main objective of INLOC Robotics is to develop positioning and navigation solutions for mobile robots in buried environments.
CIMNE Tecnología owns 5% of INLOC Robotics since October 2015.

COMPUTATIONAL AND INFORMATION TECHNOLOGIES, SA
Created in 2012
citechsa.com
Development and application of computational methods and information technology systems in engineering and applied sciences.100% owned by CIMNE Tecnología SA.

FRESH WATER NATURE, SL
Created in 2013
The company is specialized in the development of solutions for obtaining fresh water from desalinization of sea water and the distillation of waste water.
The company is 100% owned by CIMNE Tecnología SA.

HEALTHAPP, SL
Created in 2013
bcnhealthapp.com
It is focused on improving the links between therapists and patients by providing trustful information to the patients and their relatives about the therapy and its process.
15% owned by CIMNE Tecnología SA.

RSM GASSÓ CIMNE ENERGY, SL
Created in 2012
inergybcn.com
Inergy offers solutions focusing on the combination of advanced engineering energy services and pioneered own propietary products.
50% owned by Servicios Energéticos Avanzados, SL, which is 100% owned by CIMNE Tecnología, SA.

LYNCOS TECHNOLOGIES, SL
Created in 2012
lhings.com
Development, application and marketing of information and communication technologies and devices for a wide range of applications in the Internet of Things sector.
CIMNE Tecnología SA owns 15% of Lyncos Technologies, SL.

PORTABLE MULTIMEDIA SOLUTIONS, SL
Created in 2013
portablemultimediasolutions.com
Development and marketing of mobile pavilions incorporating multimedia technology for the leisure, sport and events sectors. The company is 20% owned by CIMNE Tecnología SA.

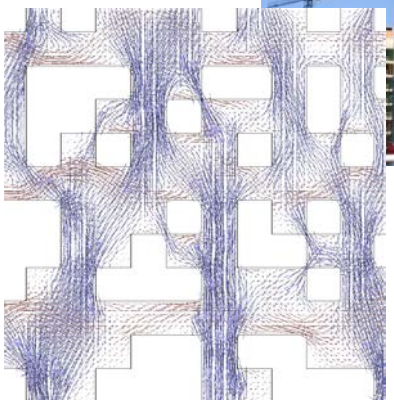
PNEUMATIC STRUCTURES TECHNOLOGIES, SL
Created in 2015
ps-technologies.com
Solutions development for pneumatic structures applicable to a wide range of engineering problems.
10% owned by CIMNE Tecnología SA.

QUANTECH ATZ
Created in 1996
quantech.es
Development and marketing of simulation software production processes. CIMNE Tecnología SA joined the company in 2015, with a share of 3,5%.

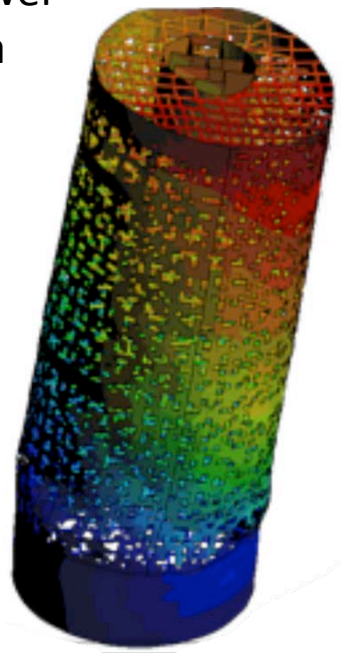
TECNOLOGÍAS AVANZADAS PARA EL OCIO, SL
Created in 2012
beaching.com
Development and marketing of information systems for leisure sectors such as tourism and music. 100% owned by CIMNE Tecnología SA.

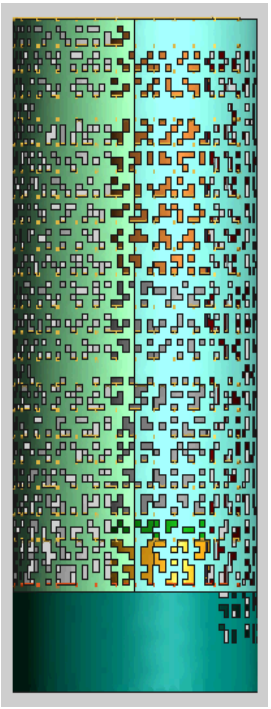
SOME APPLICATIONS OF THE NUMERICAL METHODS DEVELOPED AT CIMNE

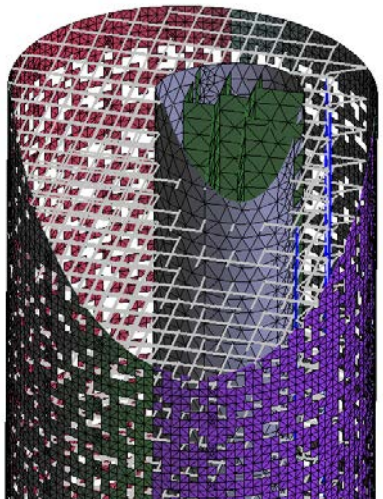
Image gallery

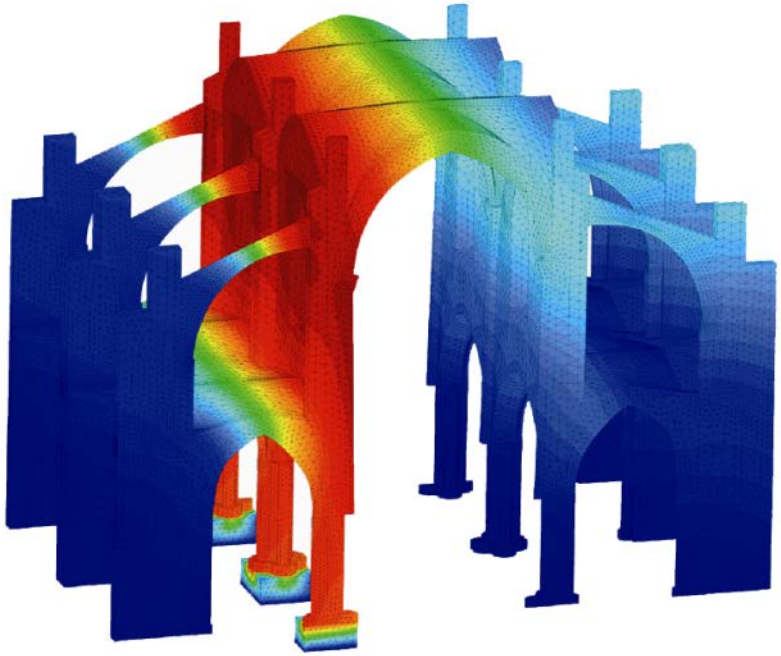


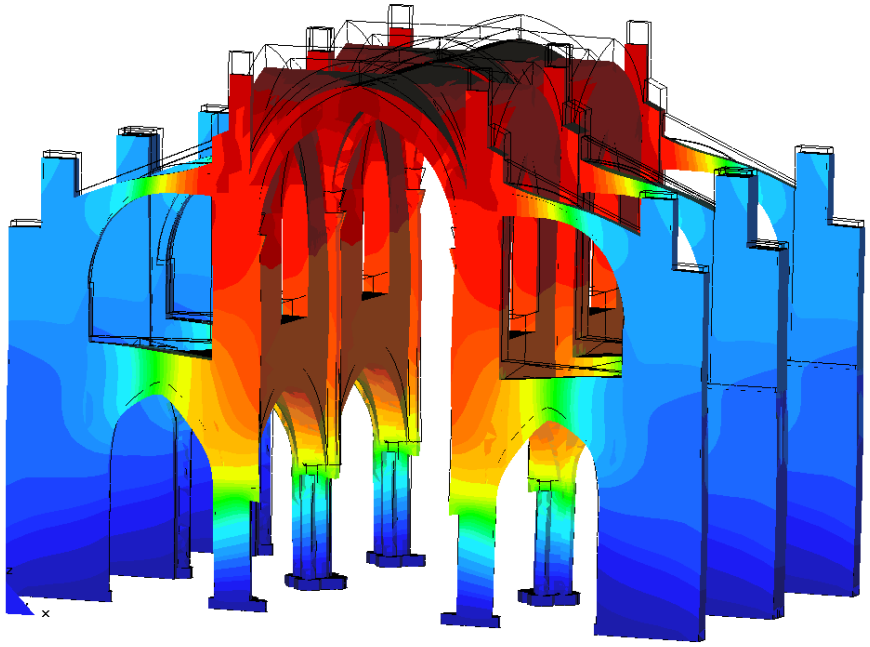
Finite element analysis of
Agbar Tower
Barcelona

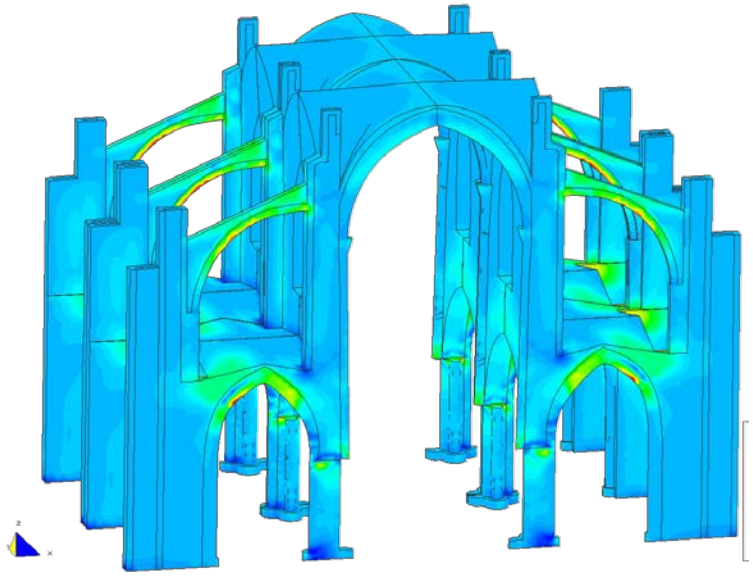


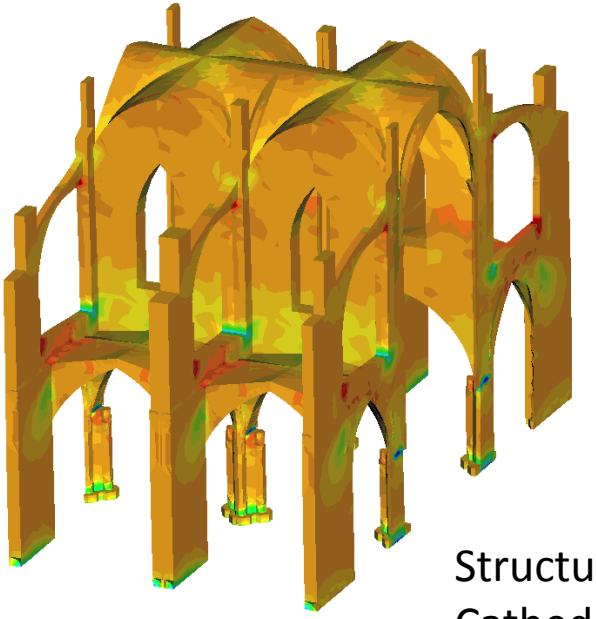




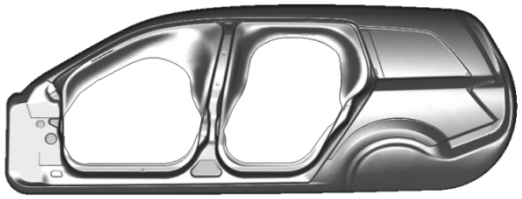


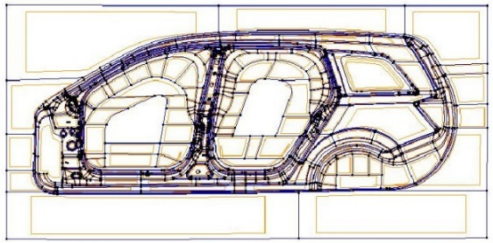


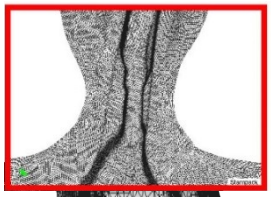


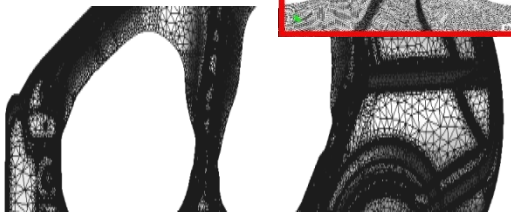


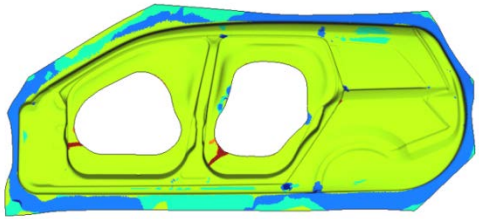
Structural analysis of Tarragona Cathedral

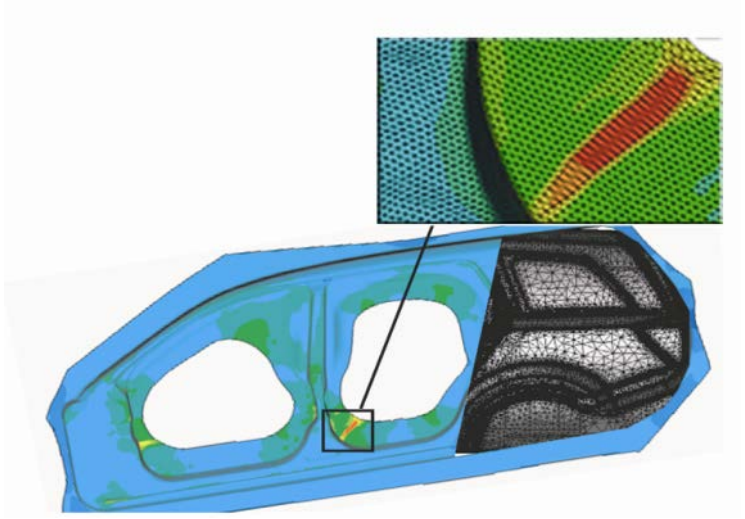


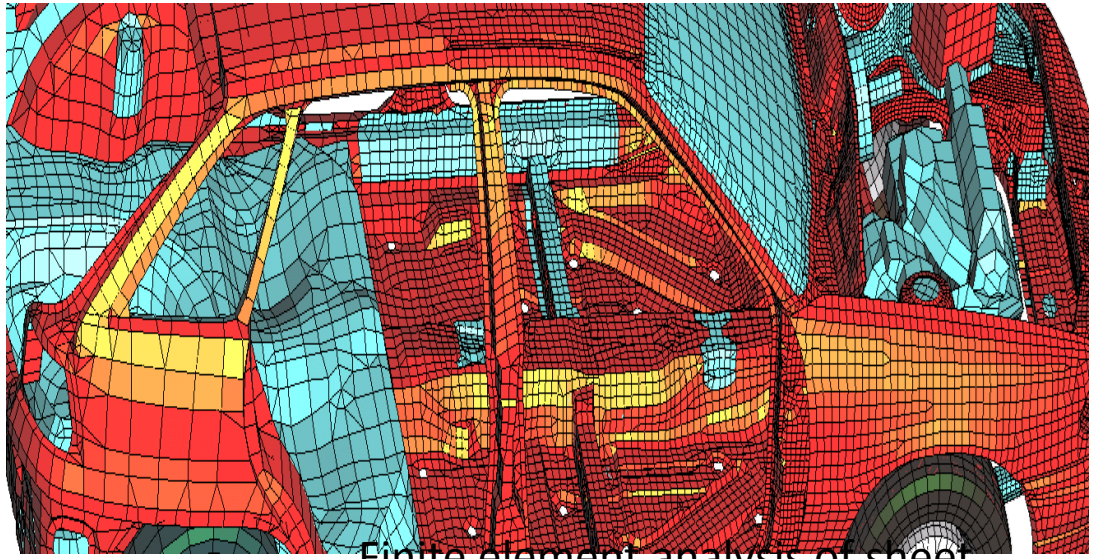


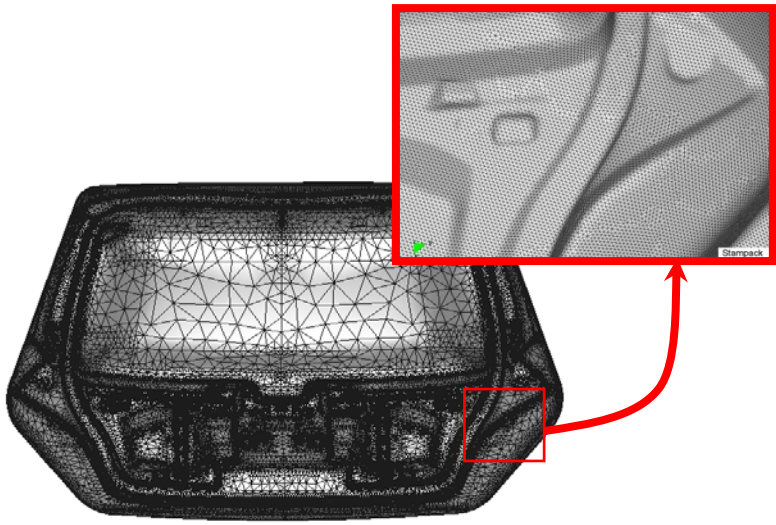




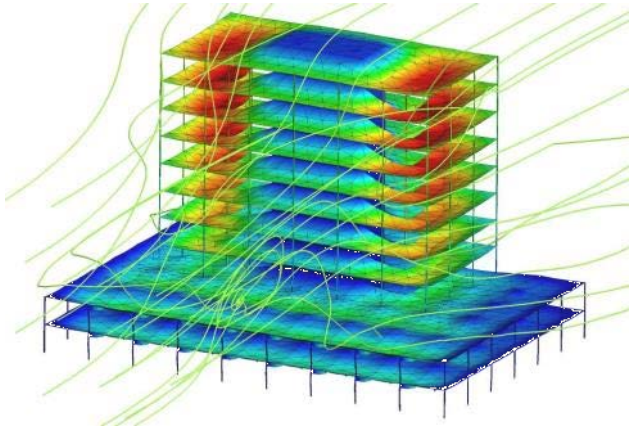


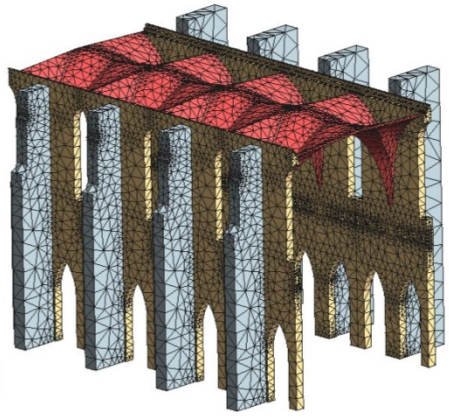


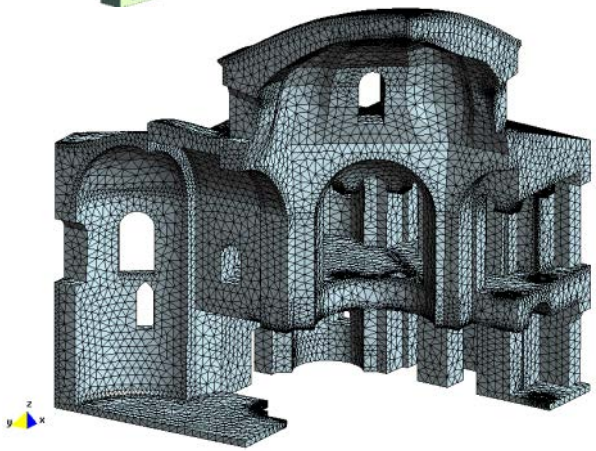


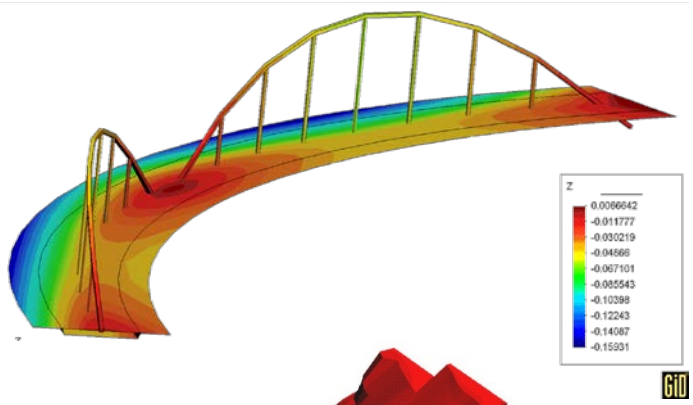


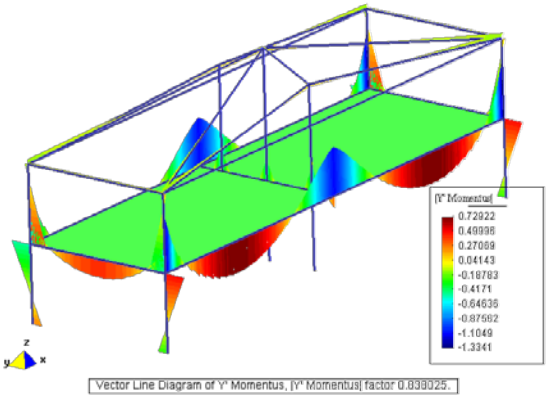
Finite element analysis of sheet parts for a car

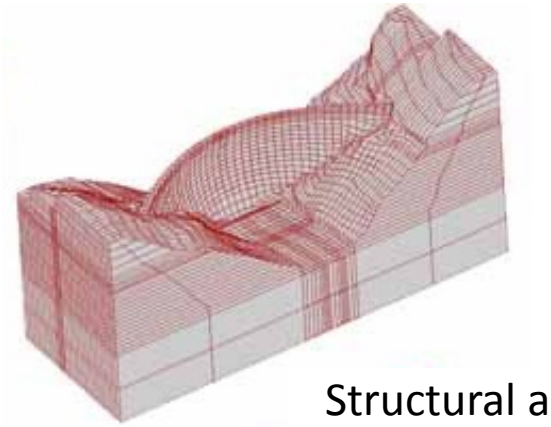


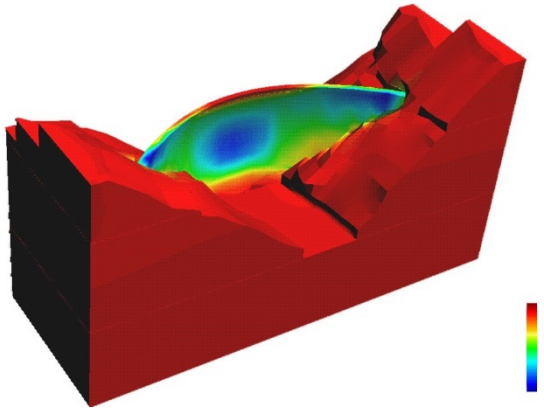


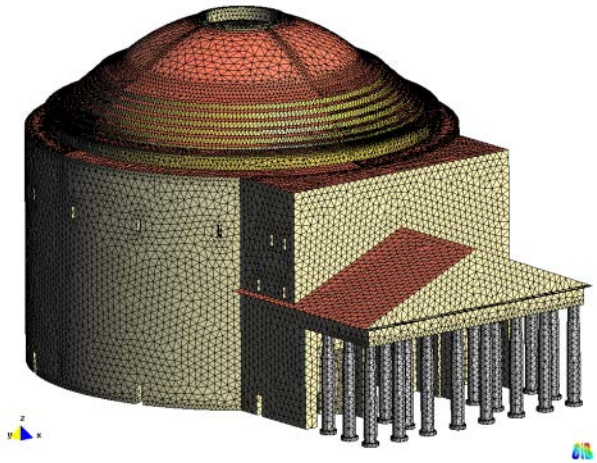




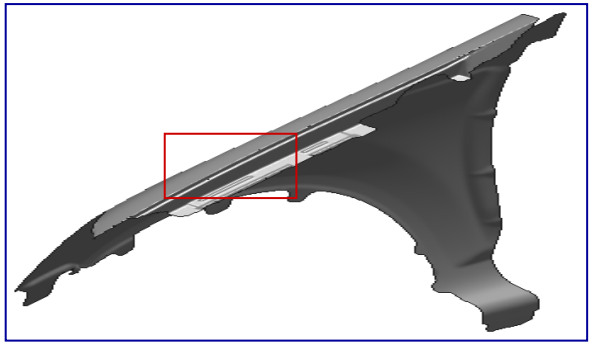


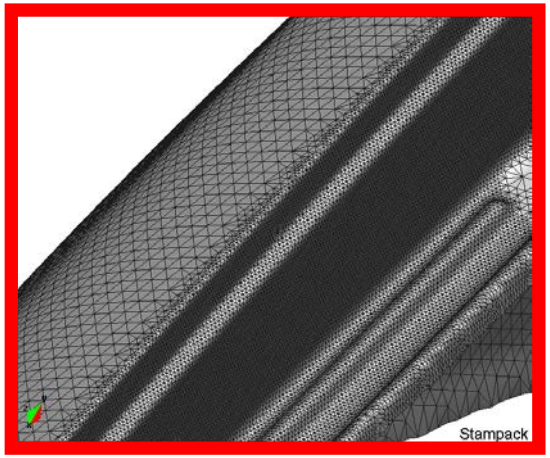


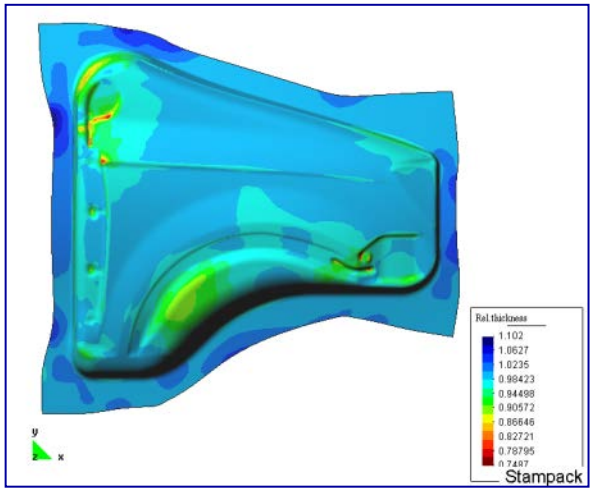


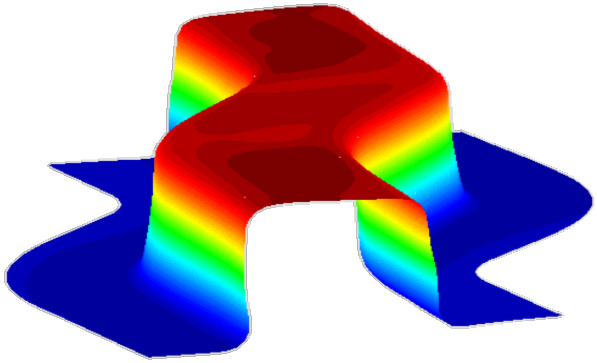


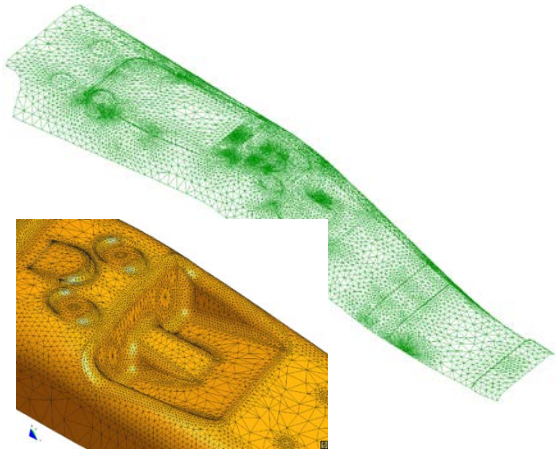
Structural analysis of building
and civil constructions



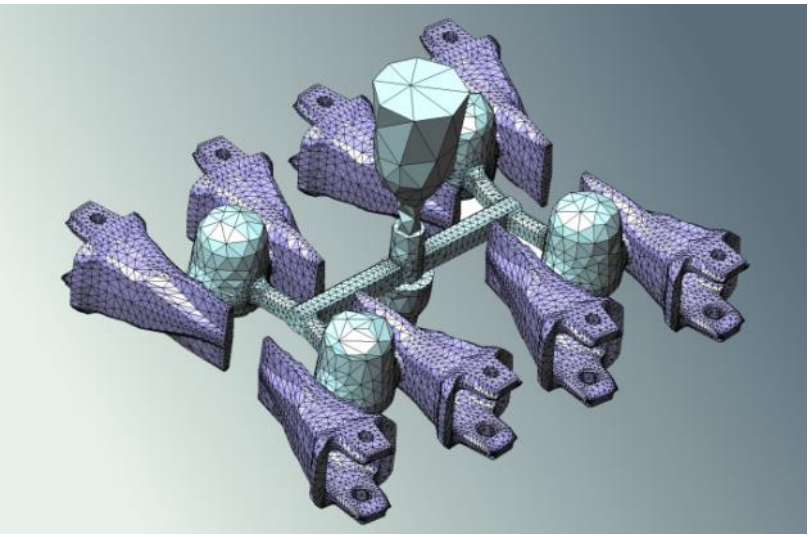


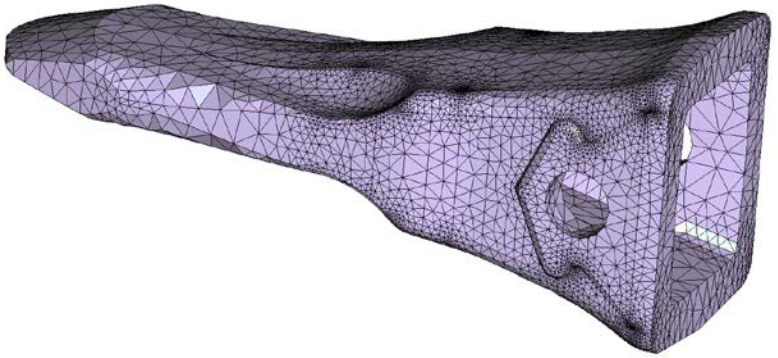


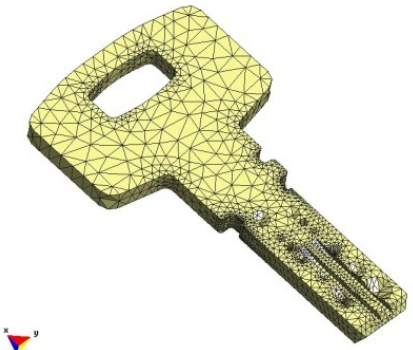


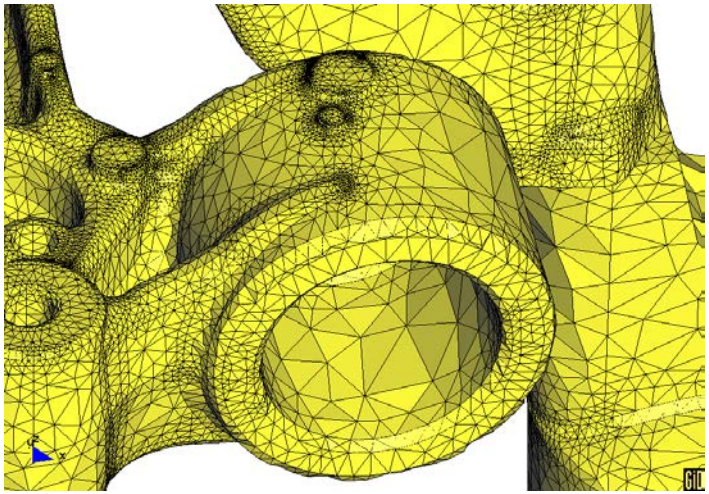


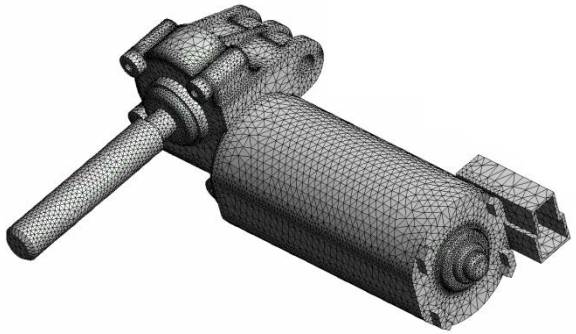
Sheet metal stamping



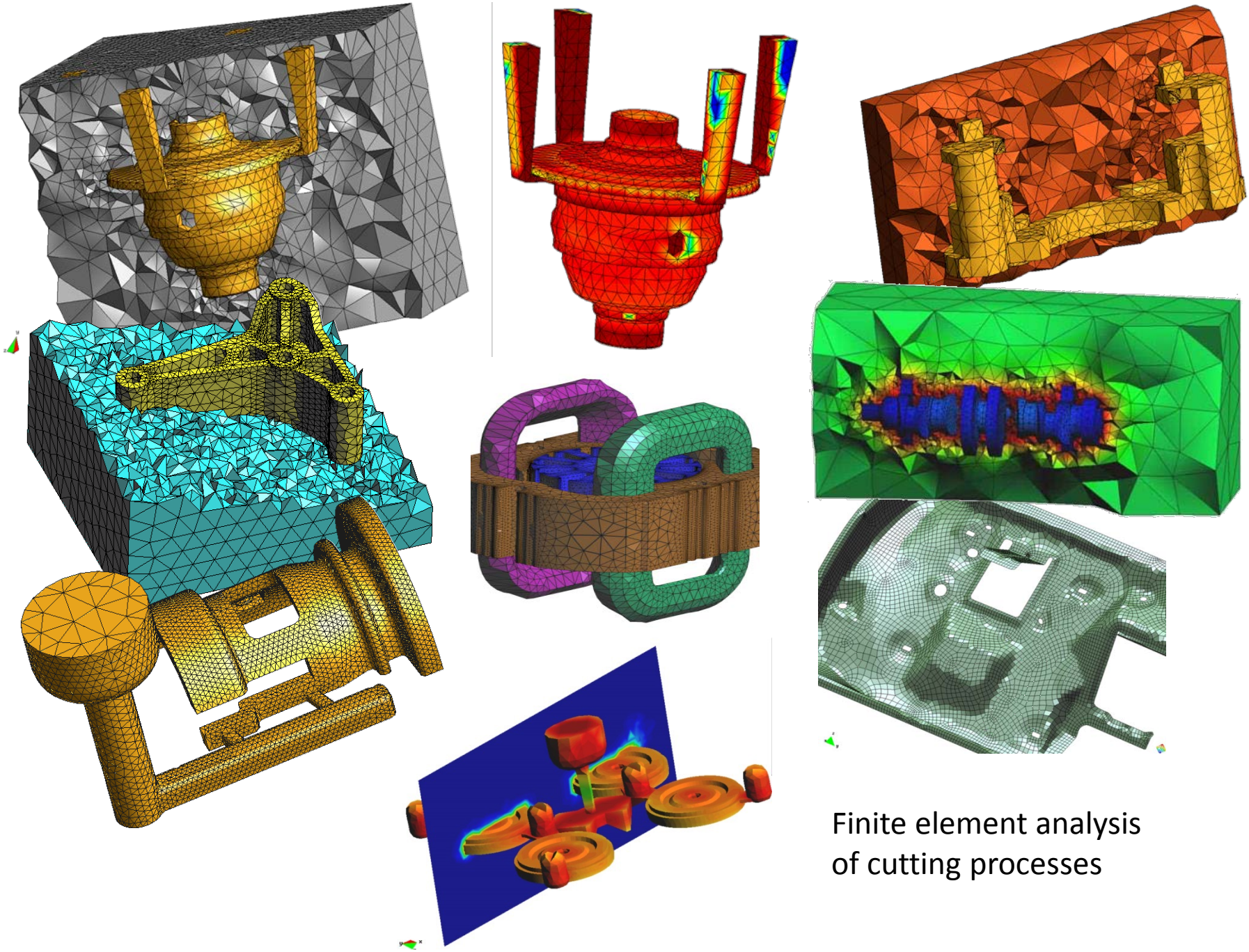






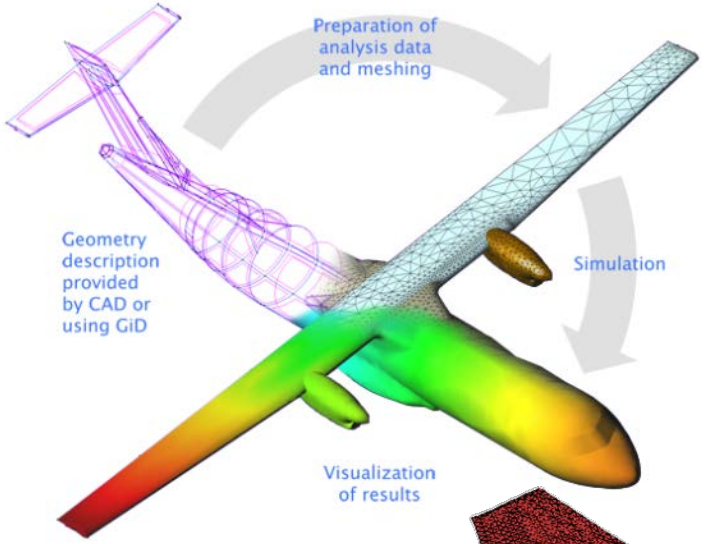


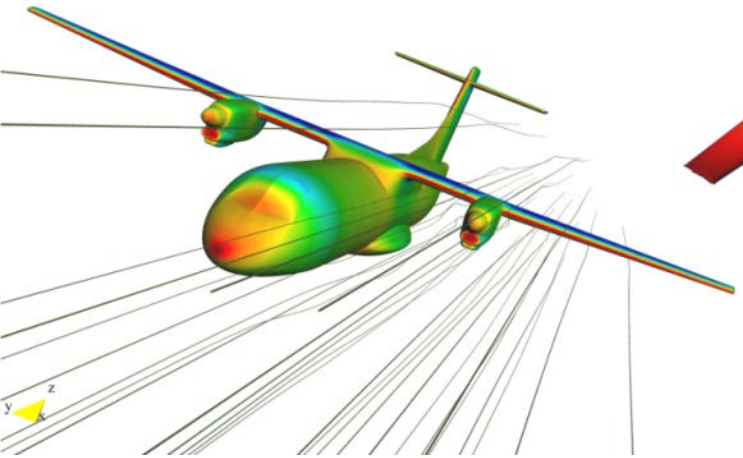
Finite element analysis
of mechanics parts

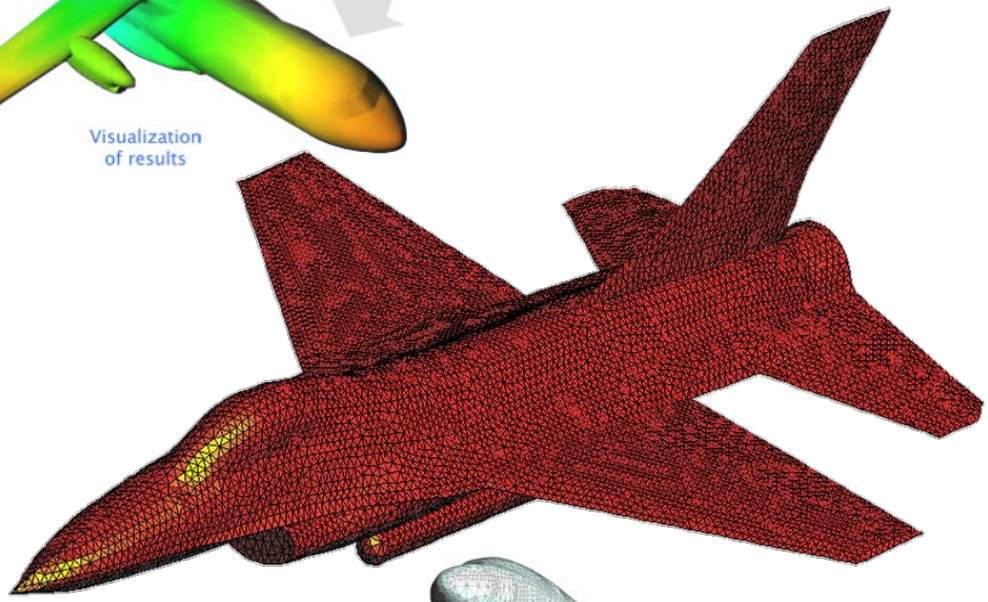


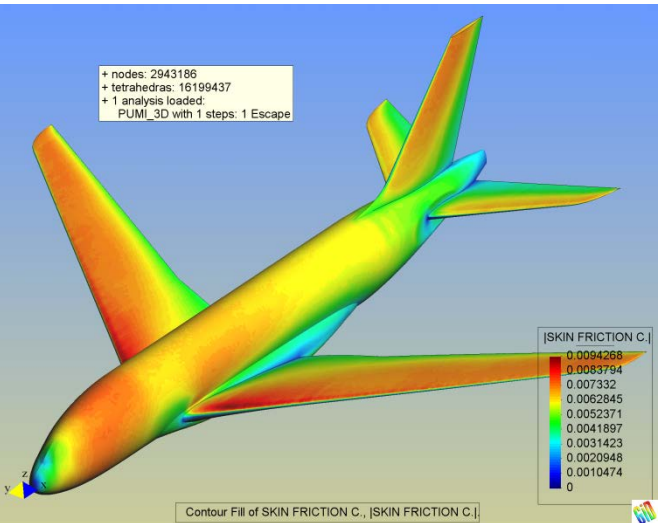
Finite element analysis
of cutting processes

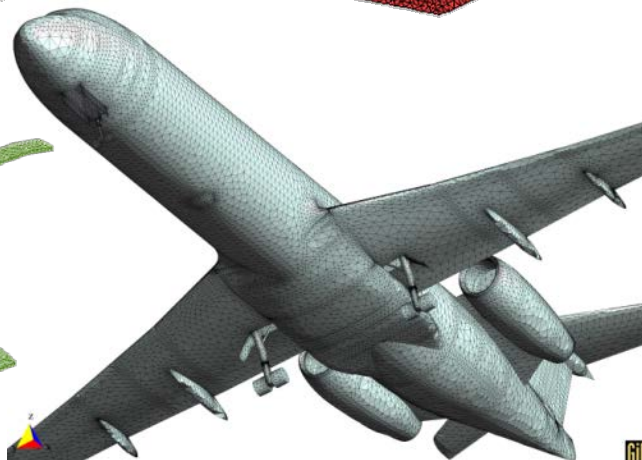
Aerodynamic analysis of an airplane

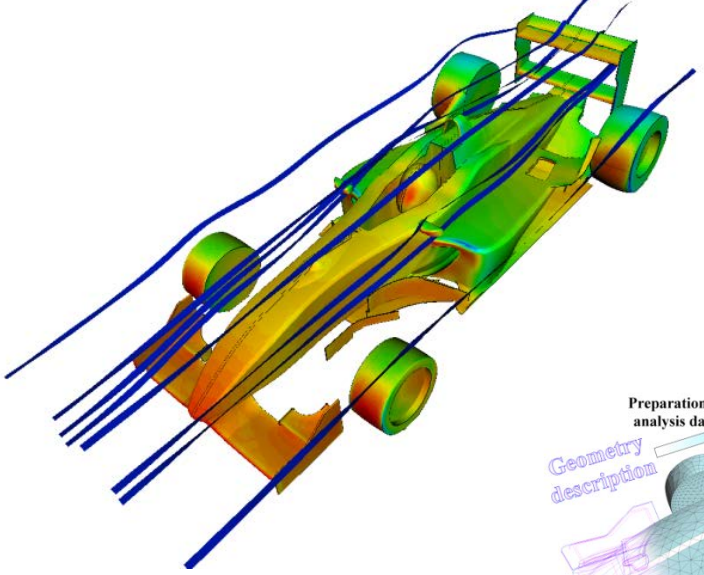


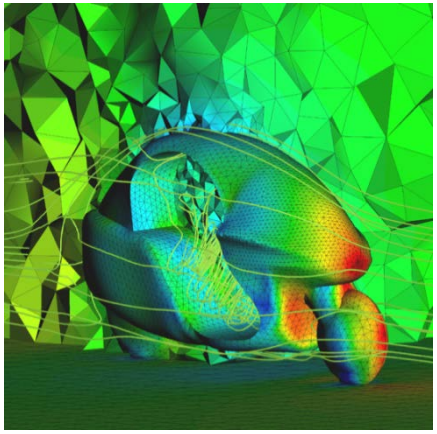




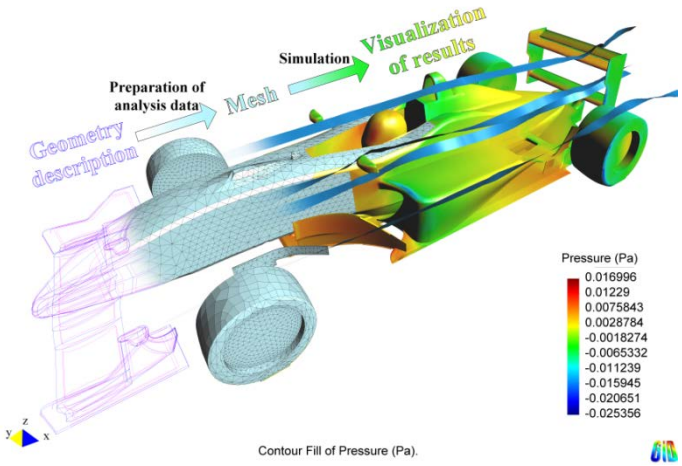


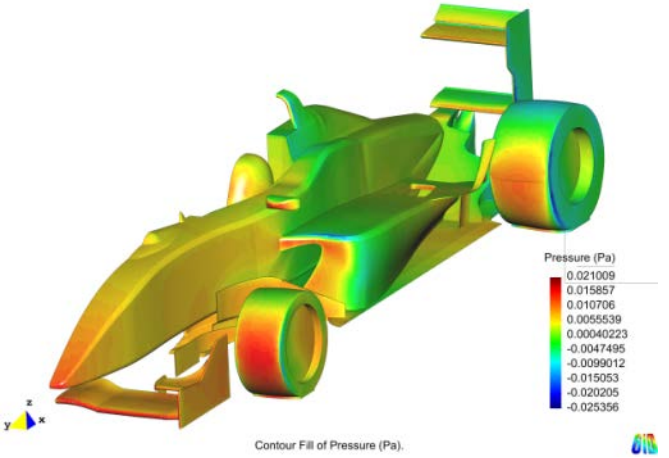


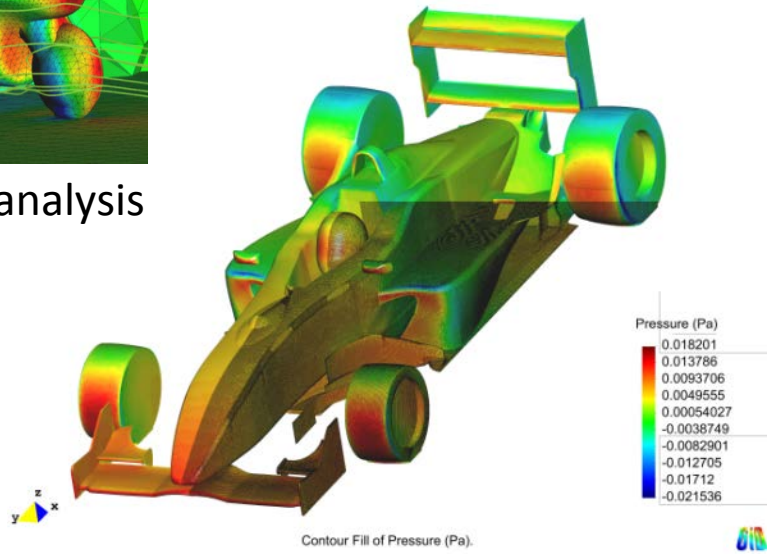


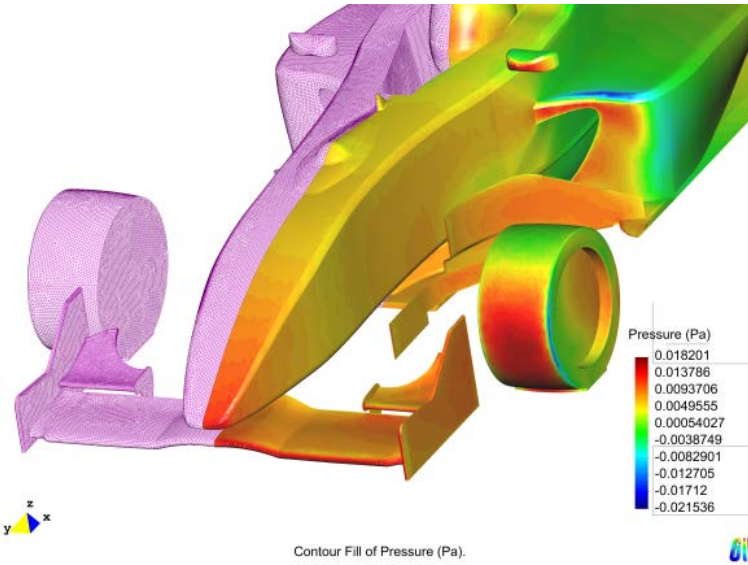


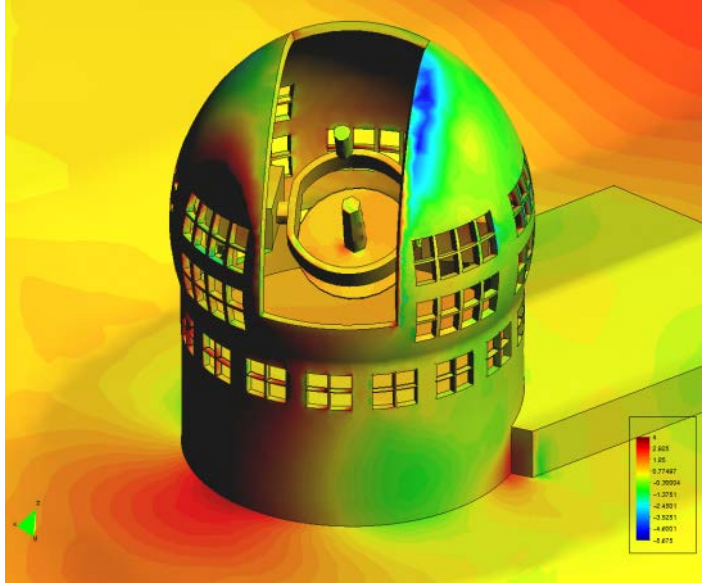
Aerodynamic analysis of a racing car

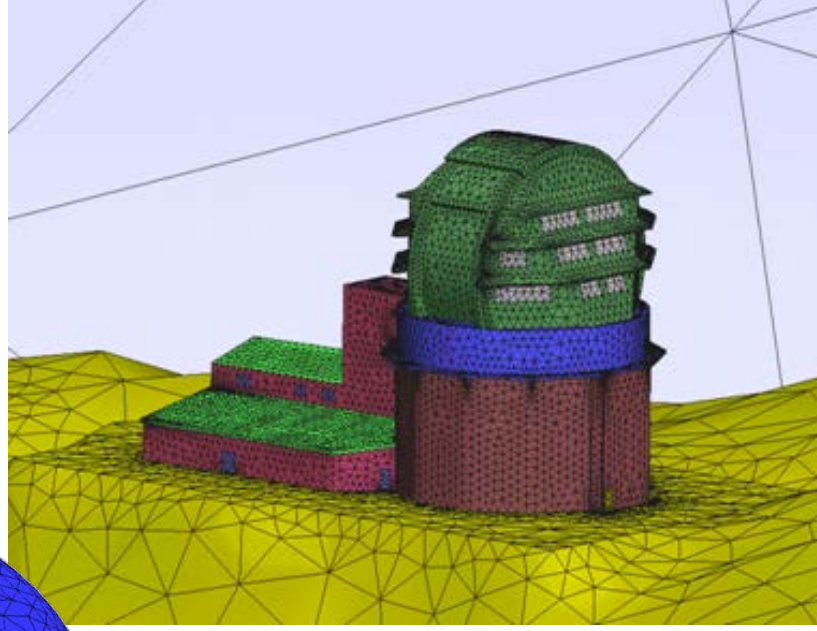


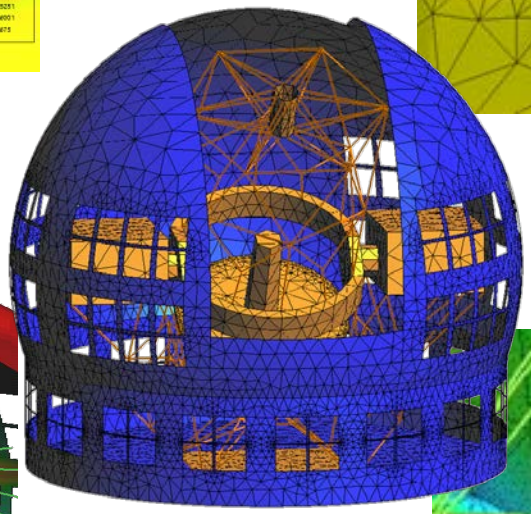




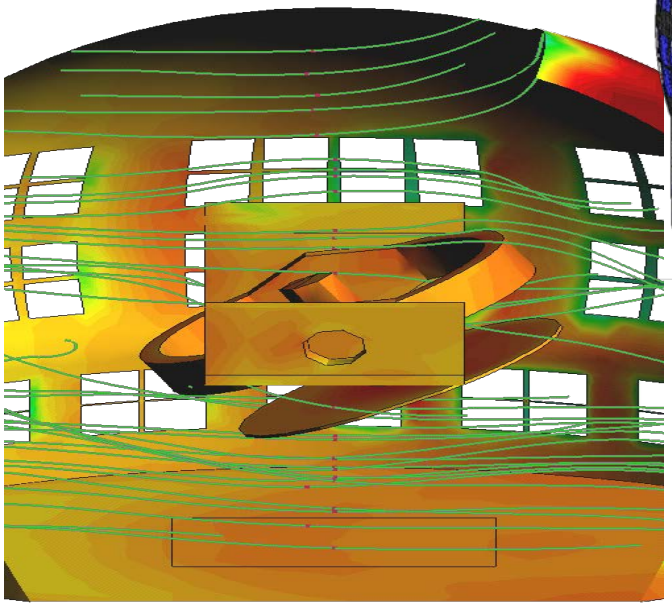


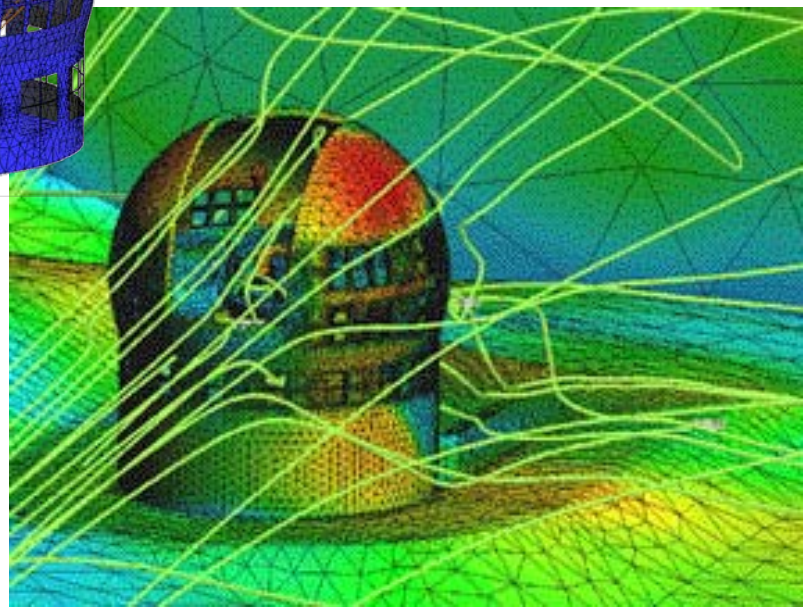




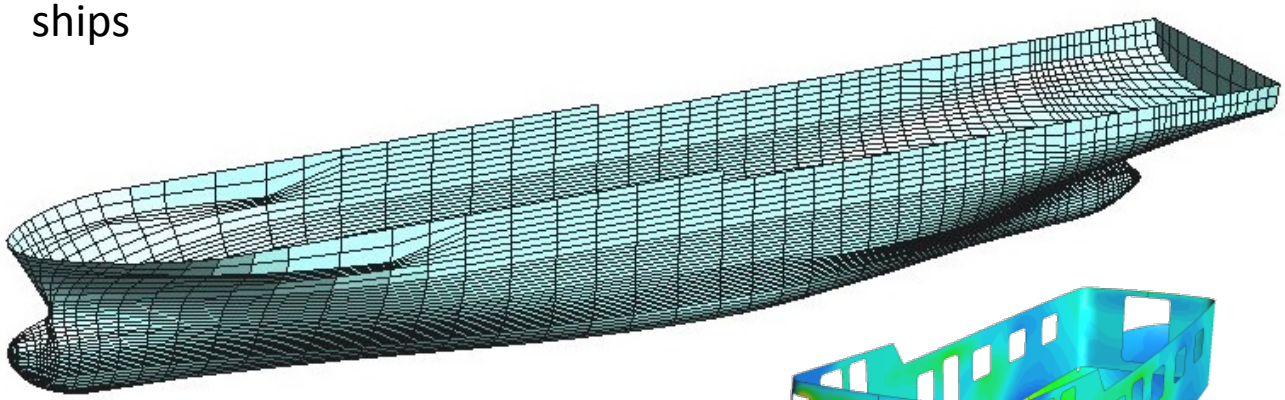


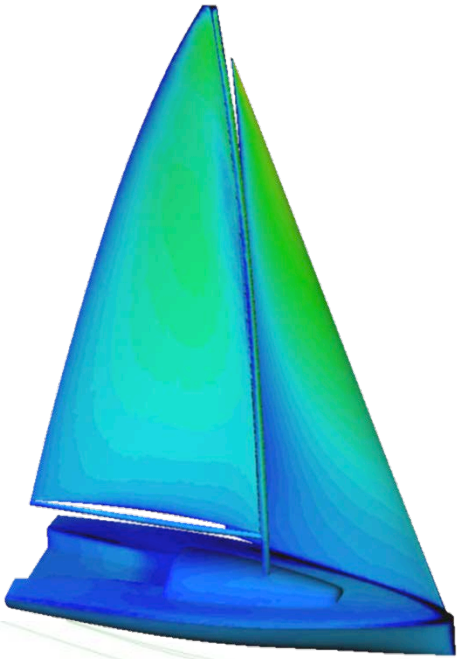
Telescope (La Palma Island, Canary Islands, Spain)

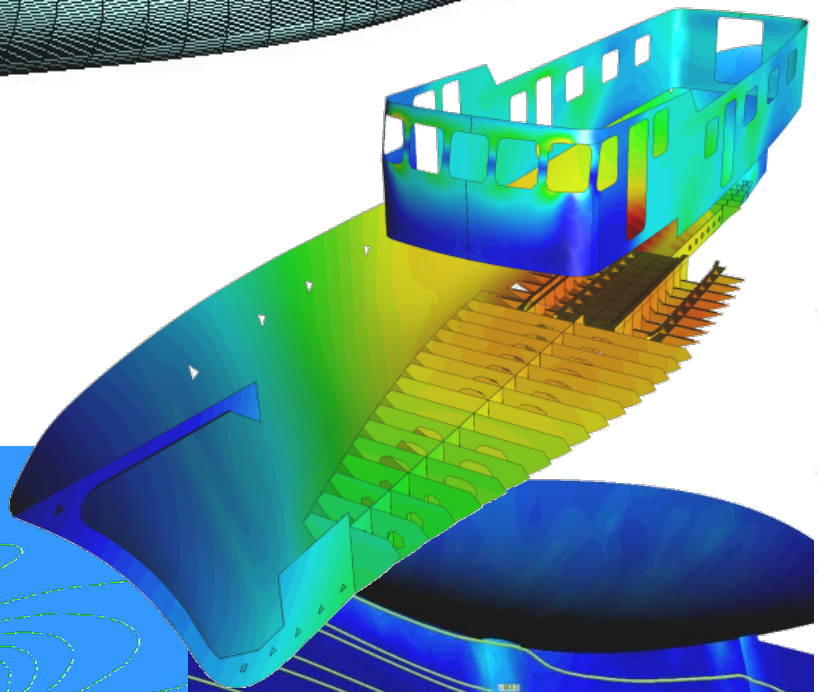


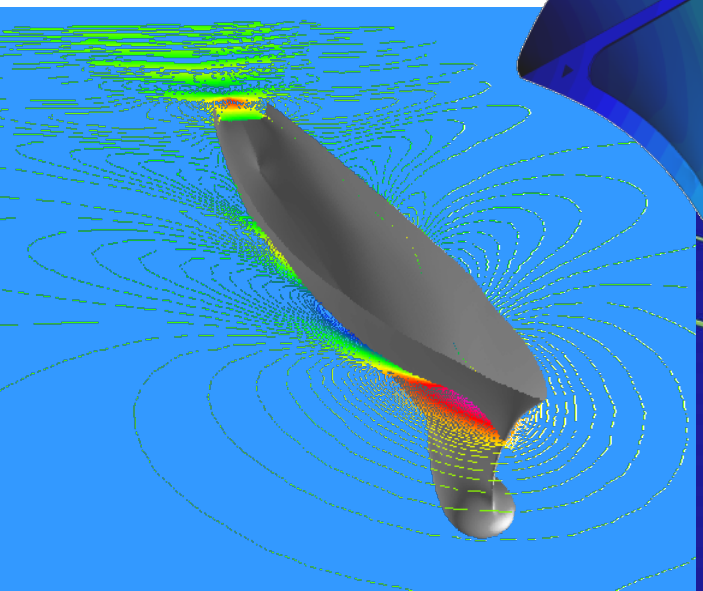


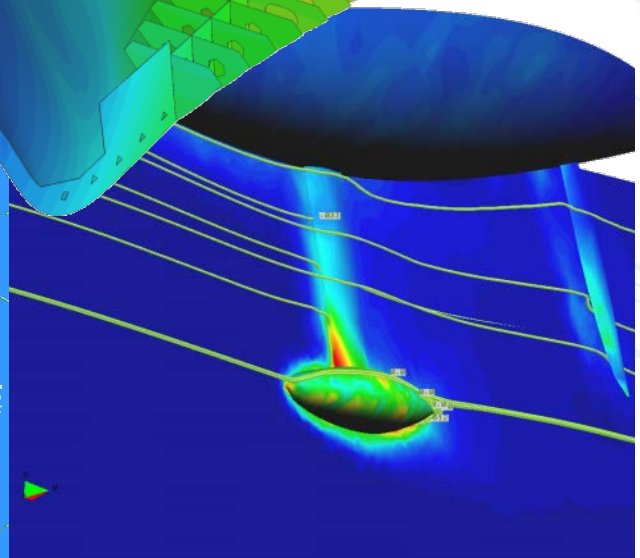
Hydrodynamics analysis of ships

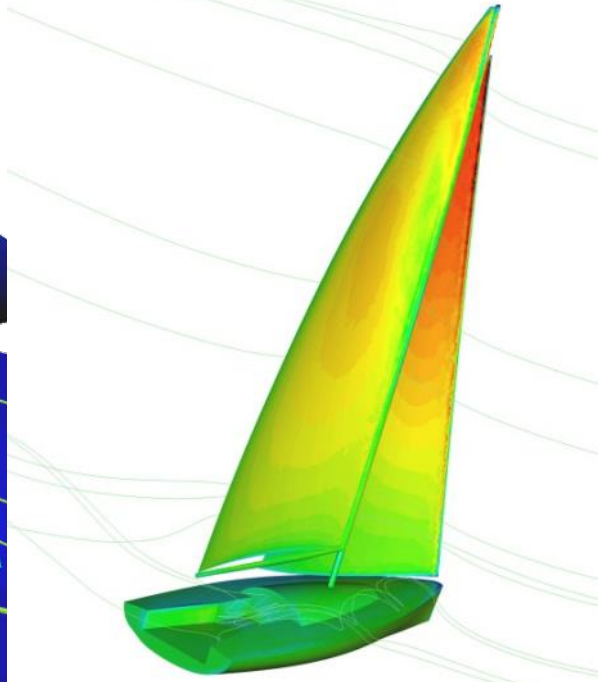


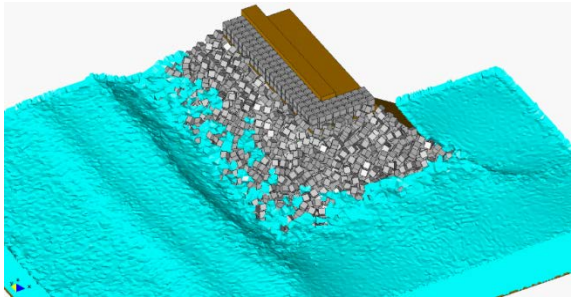


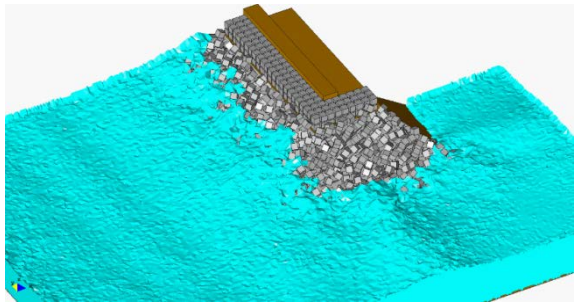


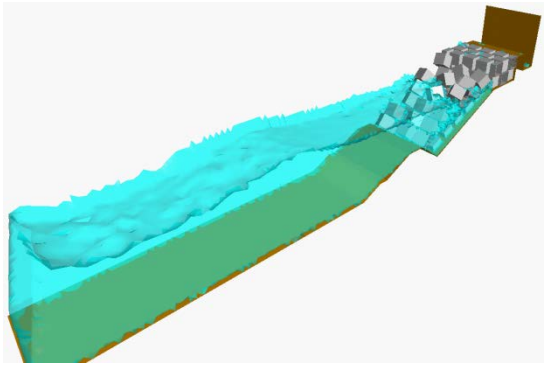


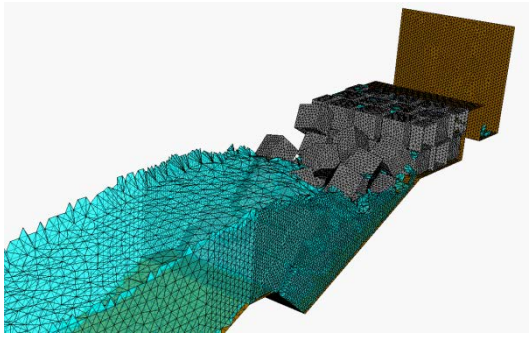


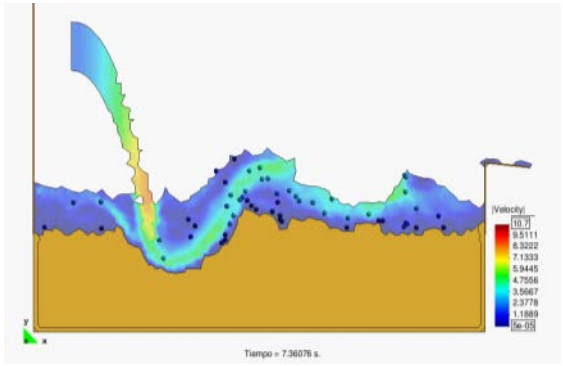








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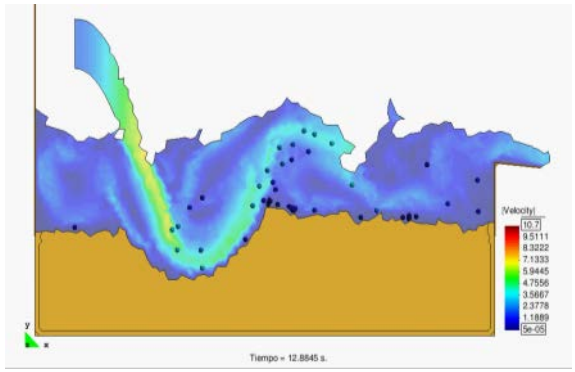
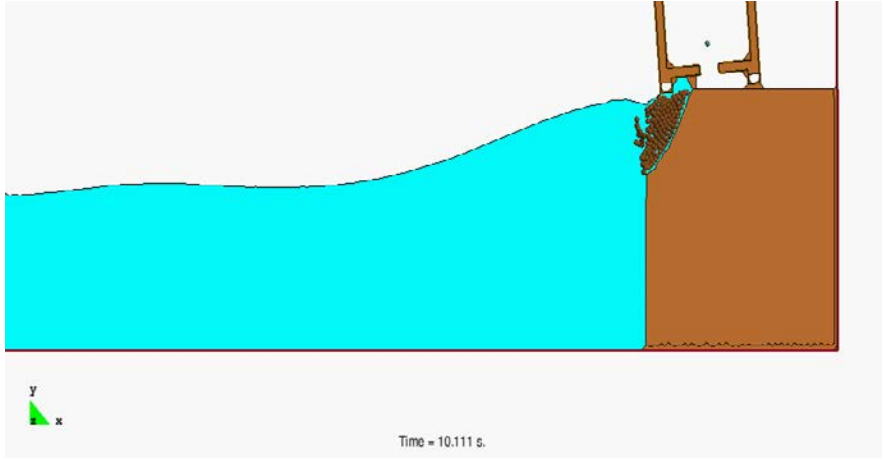
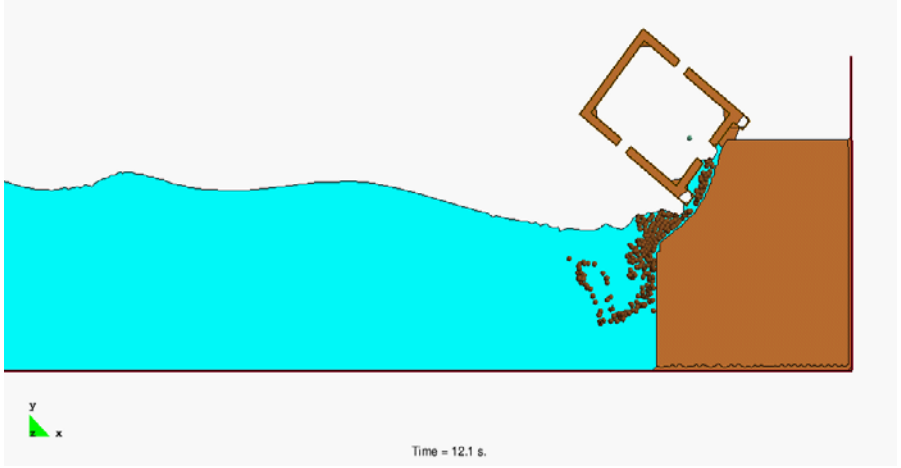
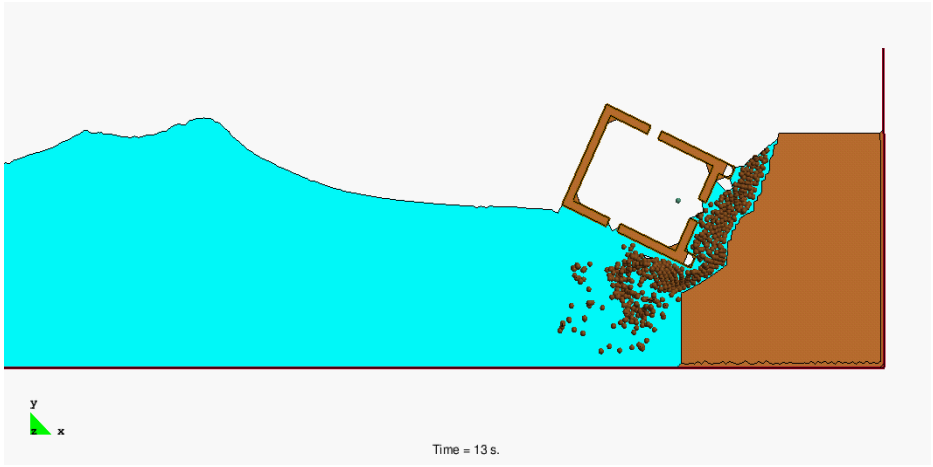
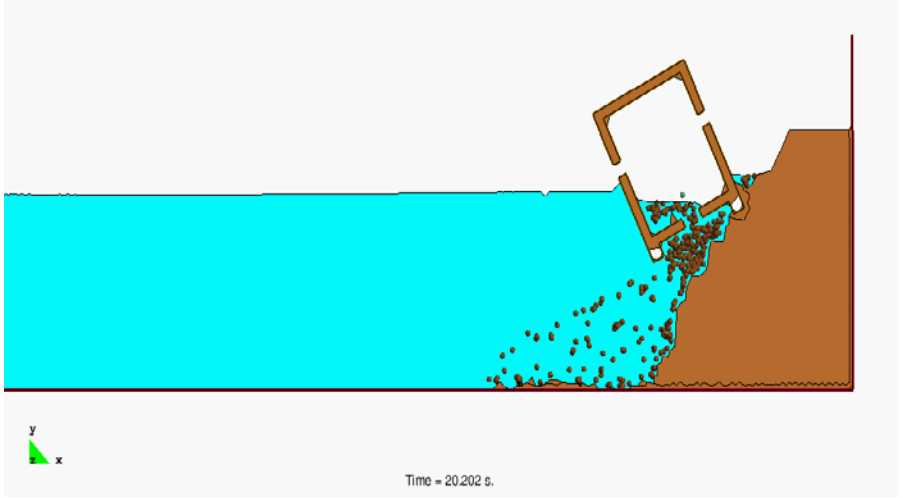
10.7
9.5111
8.3222
7.1333
5.9445
4.7556
3.5667
2.3778
1.1889
5e-05
Tiempo = 7.36076 s.

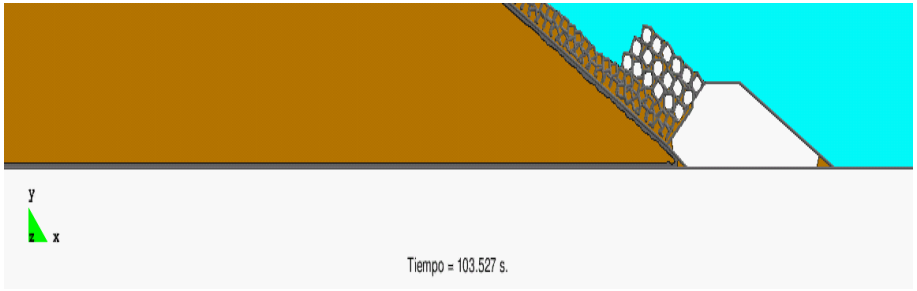

|Velocity|
10.7
9.5111
8.3222
7.1333
5.9445
4.7556
3.5667
2.3778
1.1889
5e-05
Tiempo = 12.8845 s.

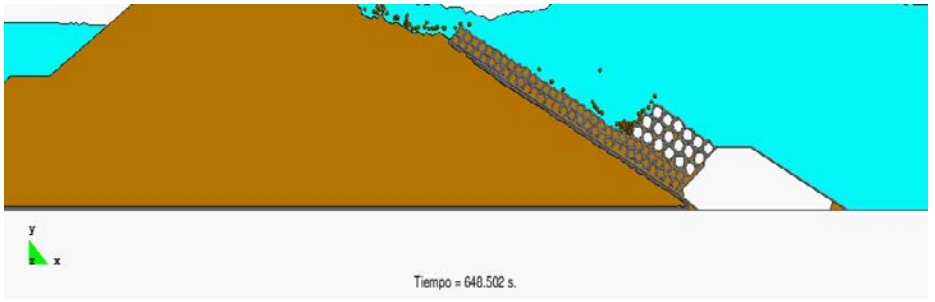

y
x
Time = 10.111 s.

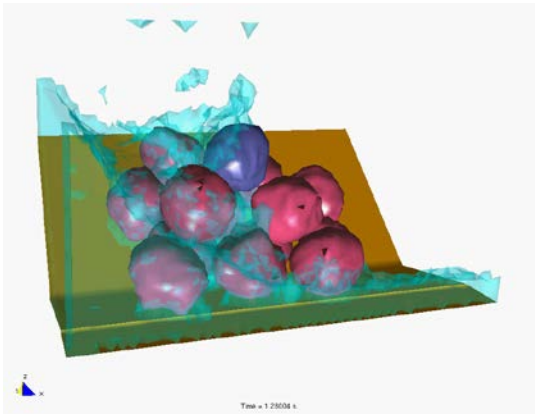

y
x
Time = 12.1 s.

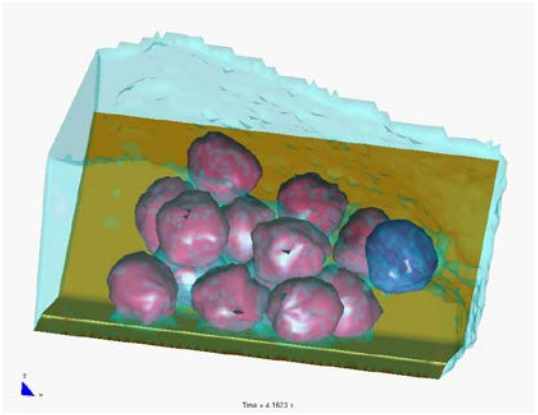

y
x
Time = 13 s.

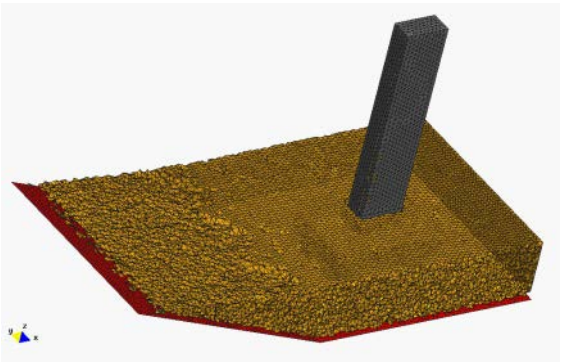

y
x
Time = 20.202 s.

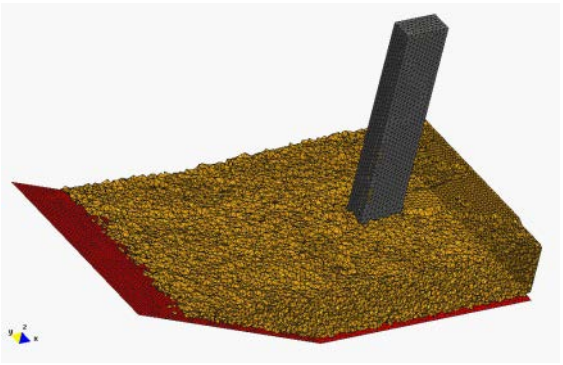

y
x
Tiempo = 103.527 s.

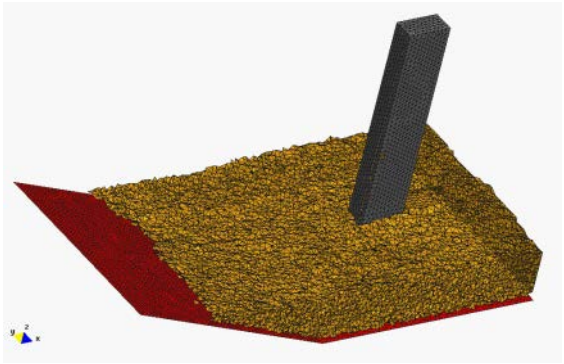

y
x
Tiempo = 648.502 s.

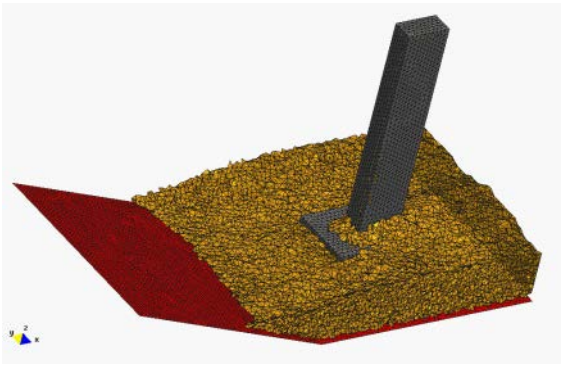


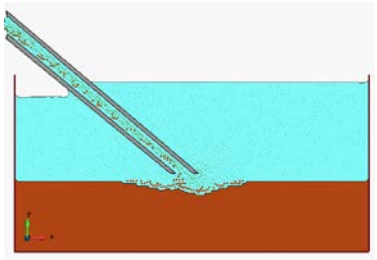
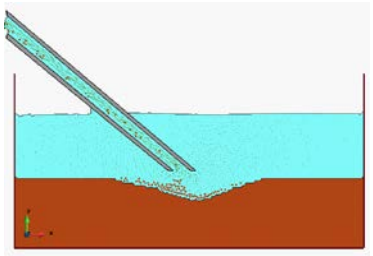
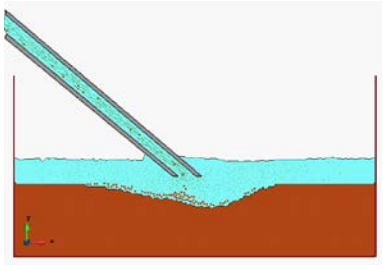
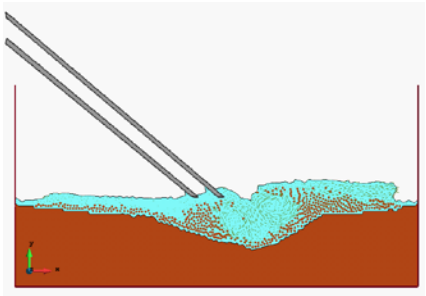
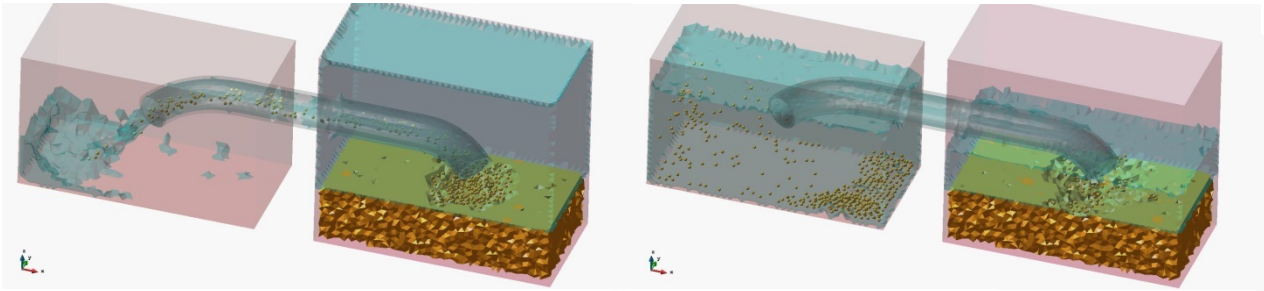
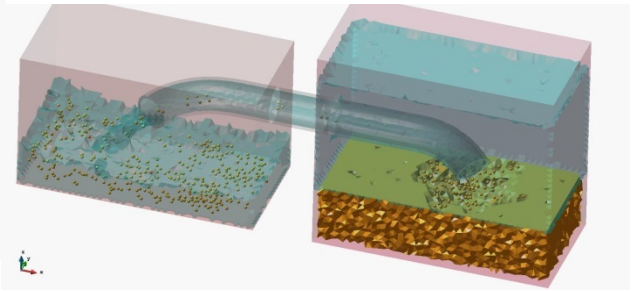
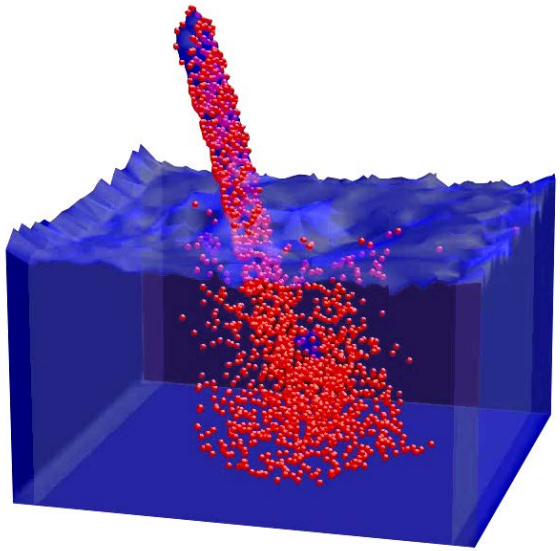
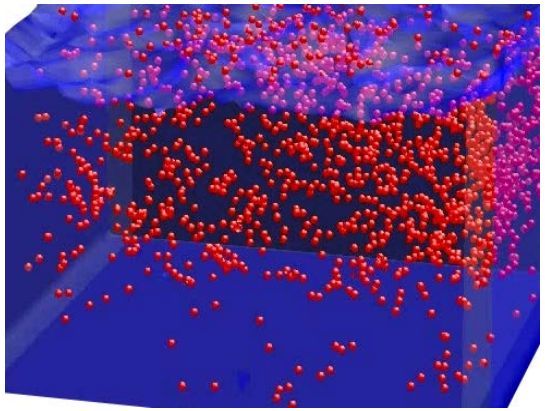


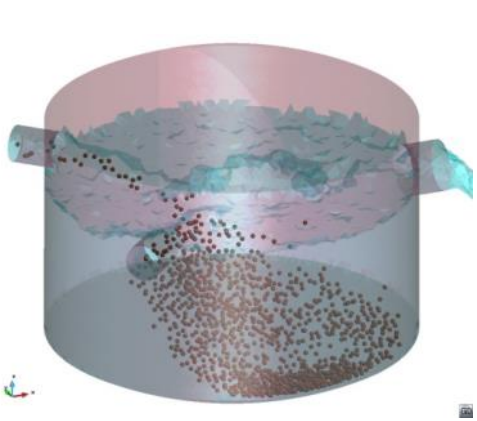
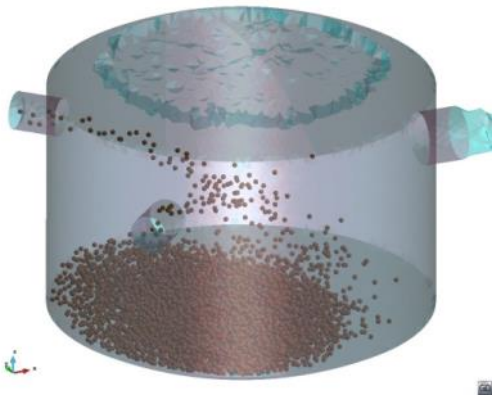
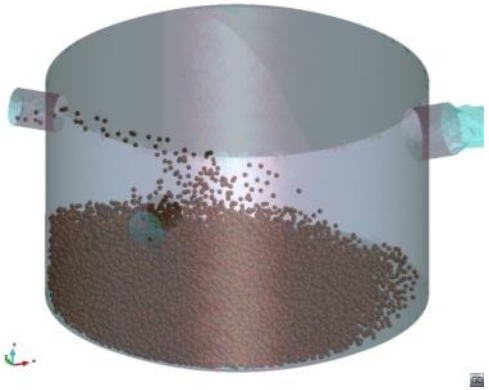


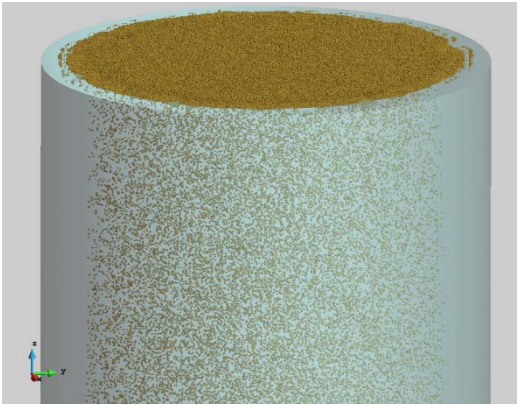
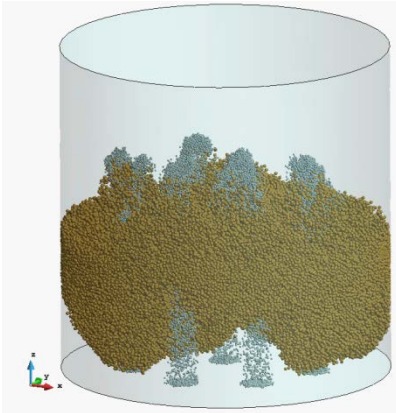
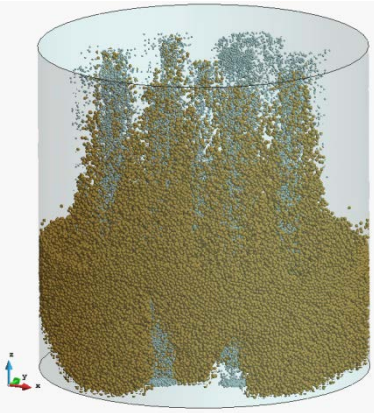
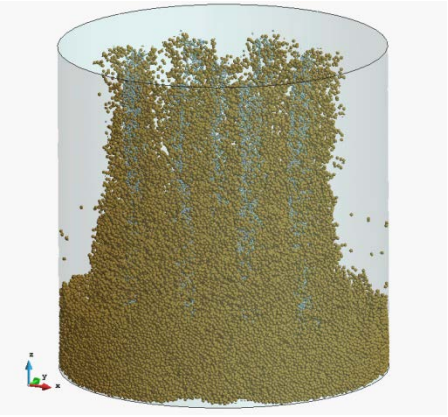


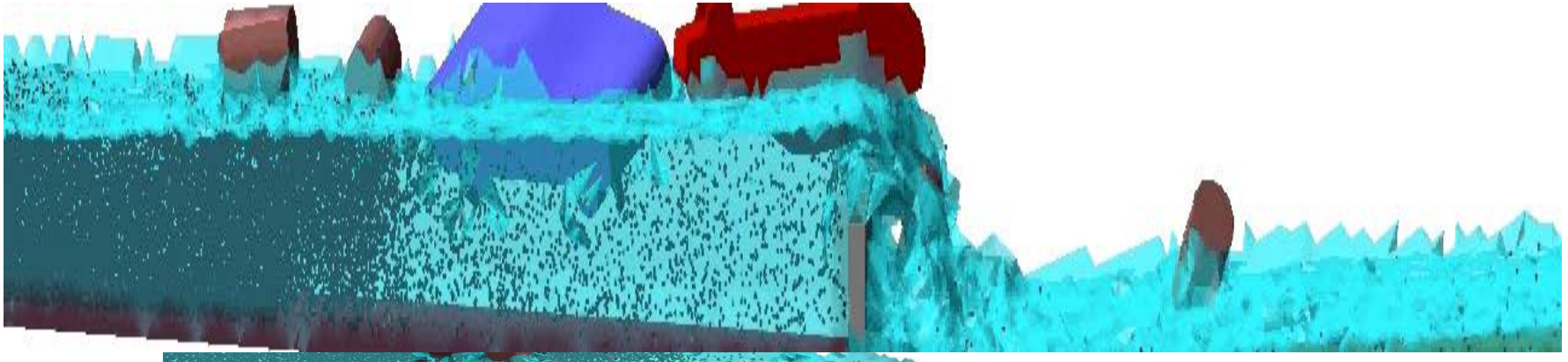


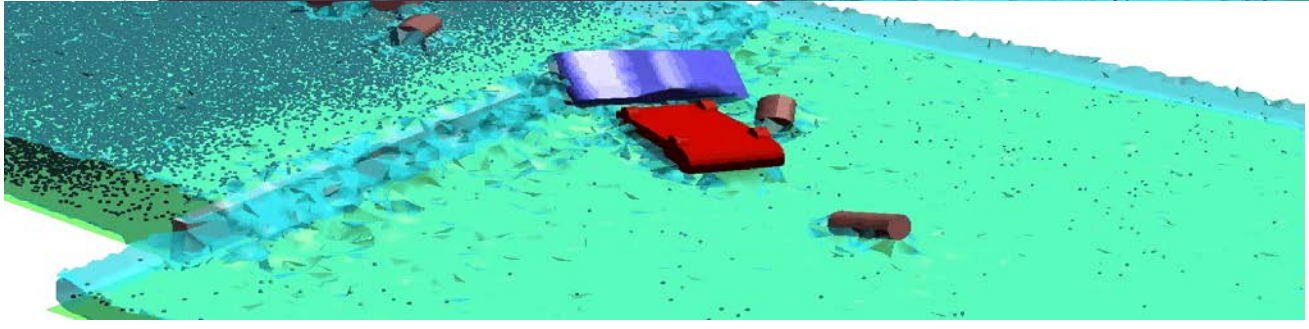






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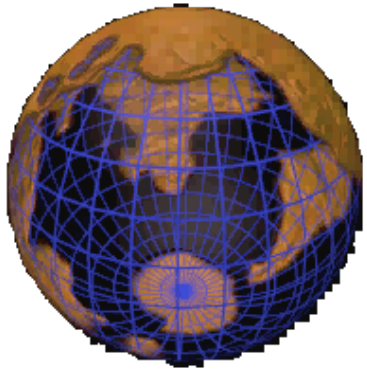

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