

Solution
Partner

Digital Industries
Software

SIEMENS

Technology
Partner

Digital Industries
Software

SIEMENS



FEAC

ENGINEERING | REALIZE YOUR DIGITAL TWIN

“Doing Business with CERN”

Thursday, 8 November 2021

Name: Sotiris Kokkinos

About Us



Consulting Projects

Delivering multi-physics simulation services covering the entire product development process.



Software Distribution

Smart Solution, Software & Technology Partner of SIEMENS DISW.



Training & Support

Certified Training Partner



Software Development

PITHIA, a unique simulation software



Engineering Expertise

Covering the entire product development process.



Aerospace/Aeronautics



Marine



Oil & Gas



Bioengineering



Construction



Renewable Energy



Accelerator Magnets

Realize your Digital Twin

Credit: Airbus Defence and Space
Source: ESA website ([link](#))
Collaboration with INASCO

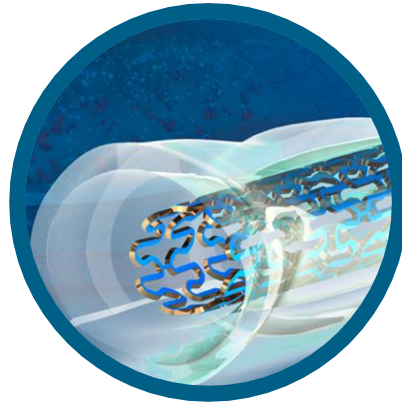
Some indicative projects



**CERN's
11T magnet**



**ESA's Juice
Mission**



**Coronary
Stent**



**Vessel's
Scrubber**

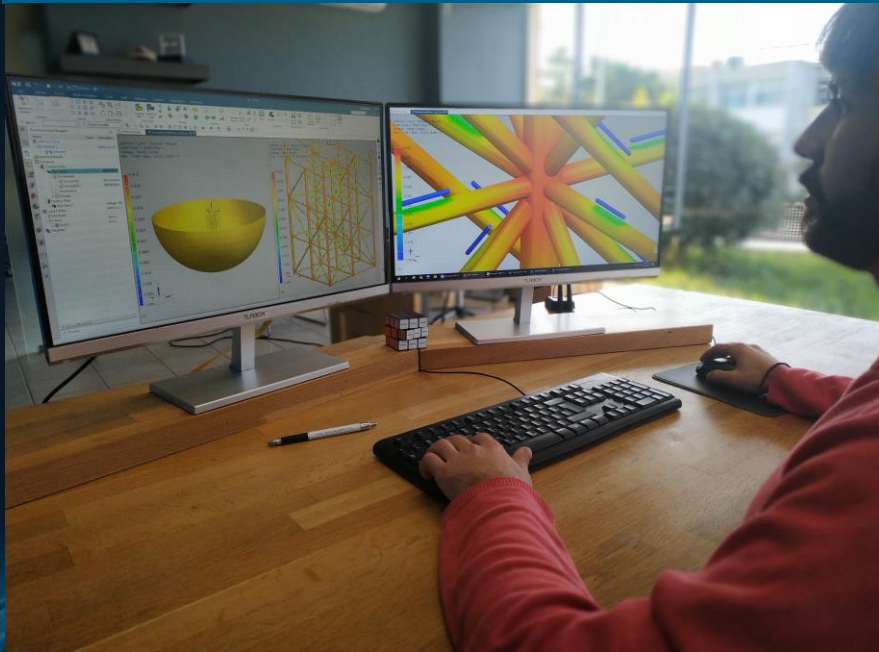


**Car's
Engine**

Some Of Our Partners And Clients



Company



Skilled team with Ph.D. Engineers & M.Sc. Engineers



Broad Portfolio of Engineering Services including Structural, CFD, Thermal, Electromagnetics analysis

Numerous Scientific Publications



Globally recognized in the technical and scientific community

One Global Award - Two National Awards

Beginning of everything...

1st Award in ANSYS HALL OF FAME
COMPETITION

Participating in Several Start-Up
incubators & accelerators

2014

2015

Active member of the Start-Up Community
Building Company's Reputation

Projects

Joint Venture with Dept. of Mechanical
Engineering – Patra's University for the
Development of PITHIA
&
Projects

2016

2017

1. FEAC announces Partnership with Siemens PLM Software
2. FEAC selected as the 1st Greek SME for CERN's BIC to co-develop PITHIA

3. FEAC as one of the 1st Greek Companies participating in ESA's
space mission

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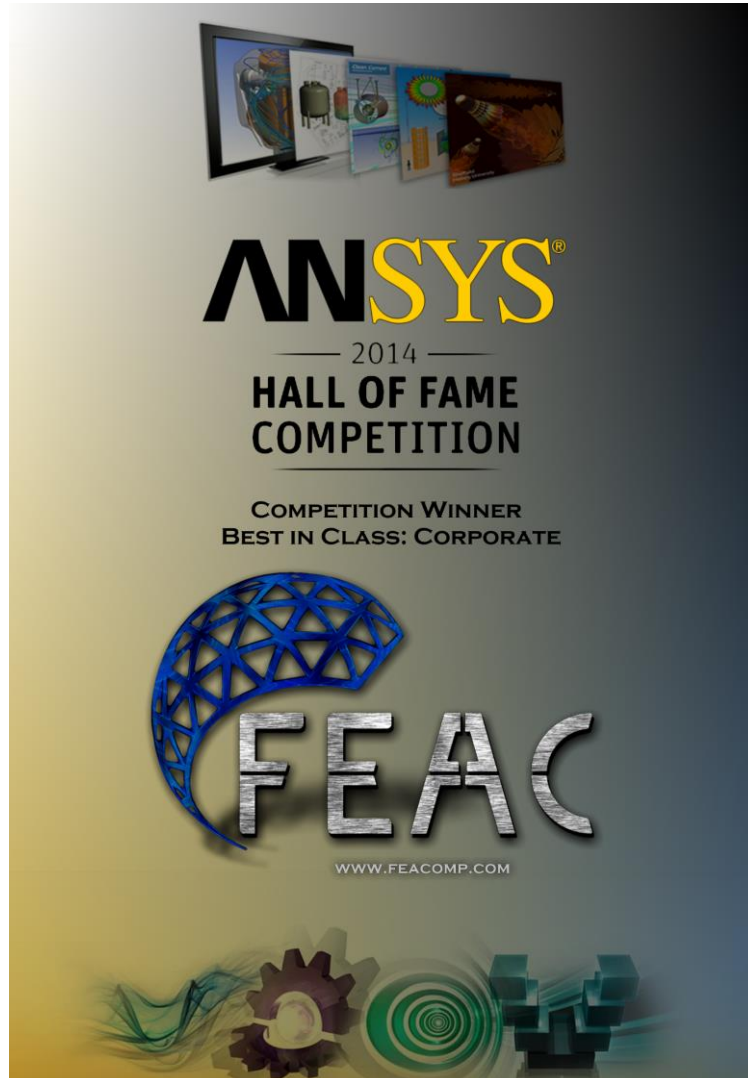
Integration of FEAC's solver,
PITHIA, in SIEMENS
simulation platform
&
Projects

2020

2021

Projects
&
participation in R&D consortia





FEAC Engineering P.C. has been awarded with the 1st price in the prestigious 2014 ANSYS Hall of Fame Worldwide Simulation Competition for company's expertise in multi-physics finite element analysis and especially in **designing superconducting accelerator magnets**. This award proves FEAC's high quality services & the top level of expertise and serves as a guarantee for the accuracy of FEAC's simulation results [ref1, ref2]. The main tools used for this award were ANSYS & CATIA .

Article in CERN Courier (Volume 54, Number 8, April 2014)



Article in ANSYS Advantage (Volume VII, Issue 2, 2014)



Article in NASA's Software Techbrief (September 2014)



Articles

1.

Agreement with CERN

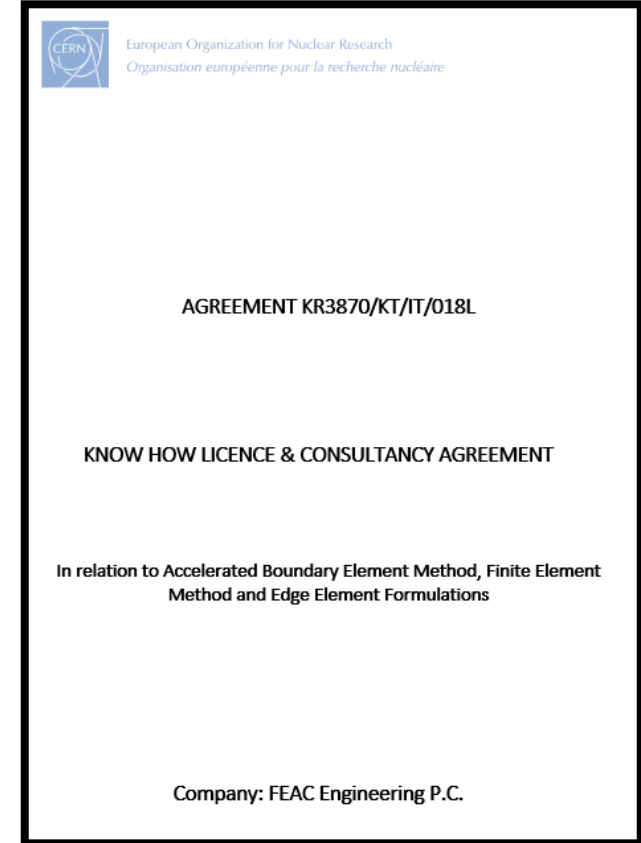
Evaluation & Knowledge Transfer

Validation of PITHIA's results by CERN

FEAC is the first company worldwide to sign a contract with CERN, for knowledge transfer in the fields of a numerical simulation tool. In the frame of this contract, FEAC will validate the results provided by PITHIA with respect to magnetic measurements and CERN's in-house tools. CERN guides & advises FEAC on possible improvements on the code which results in a co-development of the electromagnetic module of PITHIA.

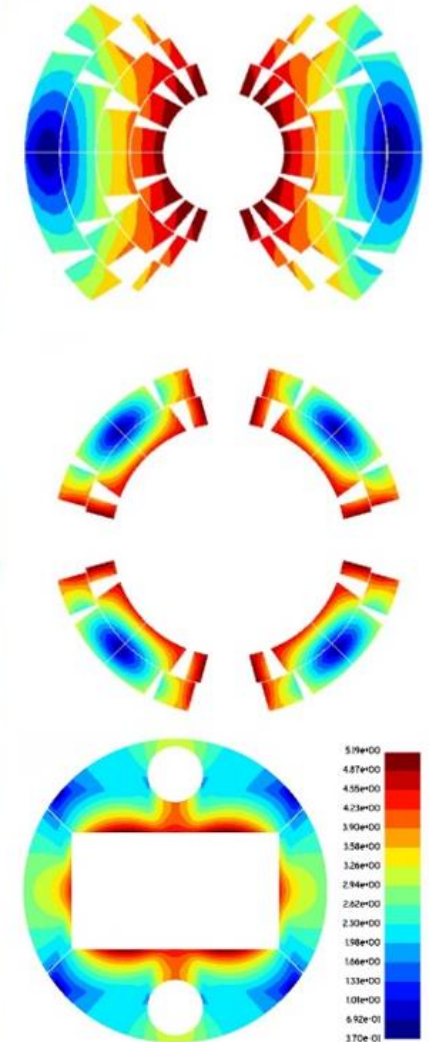
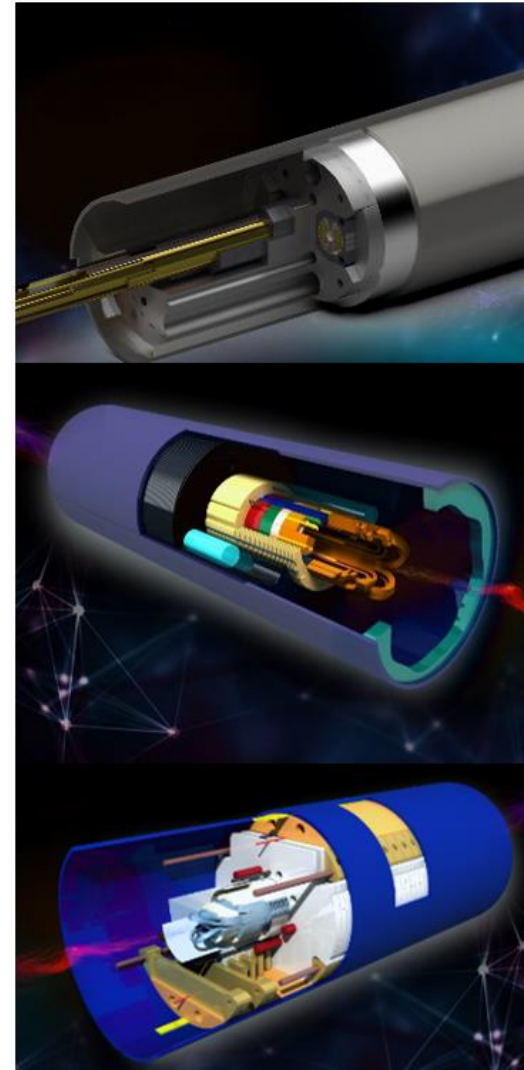


CERN's Council President, Ursula Bassler, presenting FEAC as a success – story of CERN's Knowledge Transfer Group through the BIC program.



2. Integration of PITHIA's solver in SIEMENS Simcenter 3D

Superconducting Magnets



Superconducting Magnets

Capabilities

- Magnetic induction – magnetic field intensity calculation
- Lorentz and Maxwell forces
- Modelling of arbitrarily complex coil geometry
- Simulation of non-linear ferromagnetic material behavior
- Optimization of superconducting coil magnetic field

Methods

- ✓ Coupled BEM/FEM scalar potential formulation
Coupled BEM/FEM algorithm that exploits both the advantage of BEM to treat infinite domains and the advantage of FEM to treat nonlinear problems.
- ✓ Coil magnetic field computation via Biot-Savart law
- ✓ Nonlinearity treatment with Newton-Raphson iterative algorithm

| International Conferences

MT25
The 25th International Conference on
Magnet Technology

Hosted by  **MFML**
Magnet Field Measurement Laboratory



Amsterdam, the Netherlands
August 27-September 1, 2017
www.MT-25.org



MT25 International
Conference of Magnet
Technology –
Amsterdam 2017

MT26 International
Conference of Magnet
Technology –
Vancouver 2019

MT27 International
Conference of Magnet
Technology – Fukuoka
2021



Scientific Papers

The SMC (Short Model Coil) Nb₃Sn Program: FE Analysis With 3D Modeling - <https://ieeexplore.ieee.org/document/6093936>

MT25 Papers:

- FEA Model and Mechanical Analysis of the Nb₃Sn 15-T Dipole Demonstrator - <https://ieeexplore.ieee.org/document/8292845>
- High Gradient Nb₃Sn Quadrupole Demonstrator MKQXF Engineering Design - <https://ieeexplore.ieee.org/document/8253838>

MT26 Papers:

- The 16 T Dipole Development Program for FCC and HE-LHC - <https://ieeexplore.ieee.org/document/8645687>
- PITHIA: An innovative BEM/FEM simulation software for field calculations of accelerator magnets

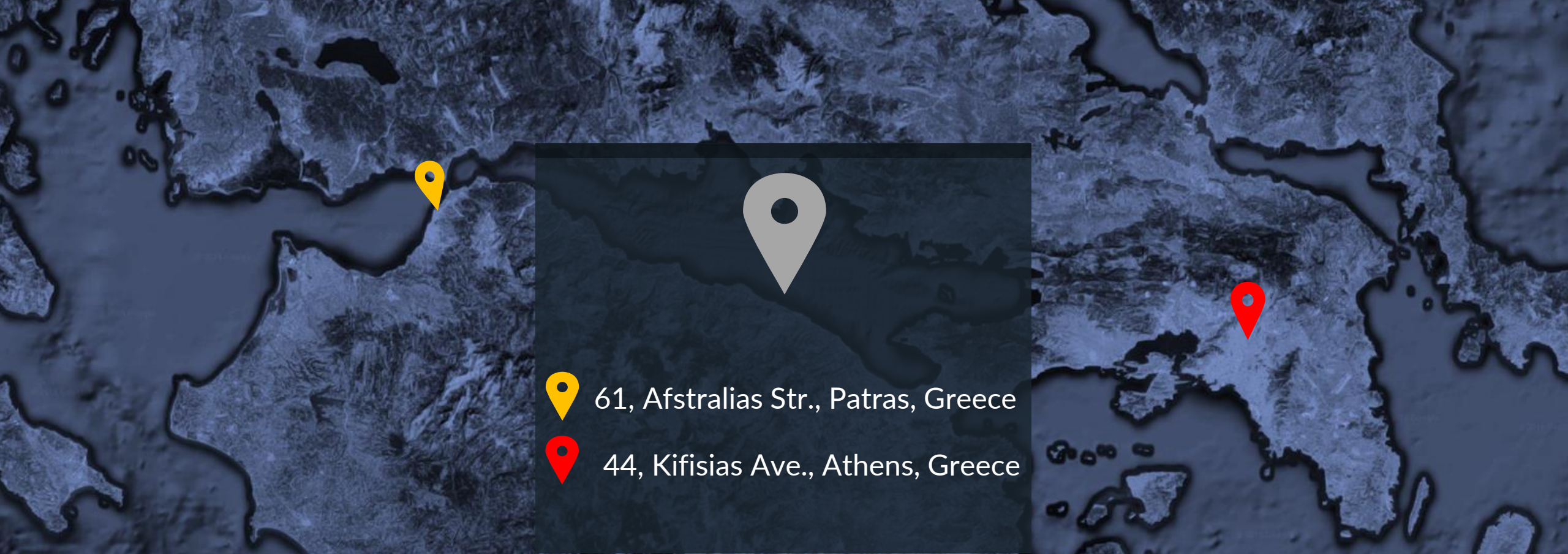
MT27 Papers (currently presented):

- Design and Digital Twin of INFN's main Nb₃Sn 15T Dipole for CERN's FCC (*publication pending*)
- Design of a Curved Superconducting Combined Function Bending Magnet Demonstrator for Hadron Therapy (*publication pending*)
- Nonlinear BEM/FEM scalar potential formulation for magnetostatic analysis in superconducting accelerator magnets (*publication pending*)



| Digital Twins for Superconductive Magnets

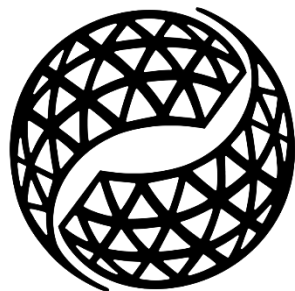
Predict and optimize the Magnets performances using Multiphysics Simulation



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