# DOCAN DO COMPANY

# SIMULATING REALITY WITH ANALYSIS 2021

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### **ABOUT US**

### WE ARE AN ADVANCED ENGINEERING CONSULTANCY AND CAE SOFTWARE DISTRIBUTION COMPANY.

### WE PRIDE OURSELVES ON OUR CAN-DO APPROACH AND ABILITY TO OFFER CUTTING EDGE SOLUTIONS TO OUR CLIENTS.

We are run by experienced Professional Engineers, Designers and Consultants following an ISO9001:2015 BSI certified Quality Management System.



Our processes and QA system are aligned with providing design and assessment services for high integrity engineering products, and we have a growing track record of delivering on significant safety-critical projects.

### OUR BUSINESS IS SPLIT INTO TWO DISCREET DIRECTORATES.

Engineering Consultancy
CAE Software Distribution

Our culture, setup and experience are tailored to working on high integrity systems within highly regulated industries, while having to deliver to challenging timescales and budgets. Our verification processes follow the requirements of our ISO 9001 QMS and are compatible with those companies which operate in highly regulated industries.



# **OUR VALUES**

Our values at DOCAN are the forefront of our identity and vision. They play a major role in the success of every project we undertake.

We are driven as a company, as a team, to bring together our expertise, powerful technologies, industry experience and insights which helps our clients solve their problems.

- To have a can-do attitude
- To have accountability
- To have integrity
- To be honest and straightforward
- To deliver on value and quality
- To have a positive social impact
- To have a customer focus
- To have the most appropriate and innovative technology solutions available
- To be positive
- To have fun and learn on the way



# **SIMULATION & ANALYSIS CONSULTING SERVICES**

At DOCAN we have a wealth of experience when it comes to simulation and analysis. Our engineers are experienced practitioners with backgrounds in simulation consultancy, academic research, and across a broad range of industries and practical engineering applications where simulation has been heavily used to solve engineering problems.

Of course, there are many aspects to engineering outside of simulation and analysis work. However, being able to visualize problems, gain insight and knowledge in a cost-effective manner, and explore design variations are just some of the benefits of employing simulation and analysis early on in an engineering project. Beyond that, the possibilities are endless.

This brochure demonstrates our skills, expertise, and the technologies available to DOCAN, as we continue to solve our clients' problems with simulation, from proof-of-concept studies, all the way through to decommissioning assessments, and everything in-between.



# **SIMULATION & ANALYSIS CONSULTING SERVICES**

We are company members of NAFEMS, so can train and develop our engineers using consistent industry practice with CAE applications that are effective and up to date. Typical reasons why are clients come to us range from:

- Lack of technical knowledge and expertise required to implement simulation and analysis technologies.
- Lack of available engineering resource.
- Budgetary constraints preventing investment in software.
- Being unaware of current technology and the possibilities of what can be achieved.

The team at DOCAN have a wide range of expertise in engineering analysis and simulation, predominantly gained working within highly regulated industries on safety-critical designs following engineering codes and standards.

We have experience working across many industries, and the following slides give an overview of what we can offer.

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# SIMULATING REALITY WITH ANALYSIS – CAE

DOCAN utilise a variety of computer aided engineering (CAE) methods, typically covered by Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD)

#### FEA

Calculate stresses, deflections and strains. Can be linear to model static systems with elastic material properties for example, or nonlinear, including contact, dynamic loading, and variable material properties.





#### CFD

Evaluates fluid flows to predict flow parameters, acoustic responses, fatigue. Whether this is to characterise process equipment, vehicle aerodynamics, or heat regulation, CFD can help solver your fluid problems.



# SIMULATING REALITY WITH ANALYSIS – Model Building

Linear analysis, although widespread in use, is often the first step of implementing analysis, either for its own simulation or as a pre-requisite of much more complex non-linear analyses. Even though linear analysis is simple by modern standards, there is still plenty to think about...

#### **Geometry Preparation**

We have access multiple 3D CAD and FE creation packages, with the following points forming key initial aspects of many simulation projects:

Building geometry from engineering drawings 
Complex Solid & Surfacing 
3D scanning /
Reverse Engineering 
Defeaturing 
Mid-surfacing 
Bolted & Welded connections

#### Meshing

While meshing is becoming more automated with developing technology, the skill of the analyst is still imperative to produce an effective and efficient mesh representation.

- This could be part of a DOCAN analysis or as a consulting service for very complex parts which require full, high quality hex meshing.
- Meshes might involve beam elements, shell elements, or solid elements such as tetrahedral, hexahedral, or combinations of all the different types.





# SIMULATING REALITY WITH ANALYSIS – Linear Methods

Here is just some of the applications where DOCAN can employ linear analysis to solve engineering problems:

**Linear-static stress analysis**, with models exceeding several million of degrees of freedom, leading to:

- Displacement and stress results.
- Fatigue and failure calculations.
- Design code assessments.
- DOCAN customised post-processing tools for custom results analysis.

**Thermal analysis** to calculate temperature fields, heat transfer through parts, and combining with structural analysis to determine thermal expansion and thermally induced stresses.





**Pipe stress analysis**, using industry standard packages for design of piping system, performing design code assessments, and in certain cases pairing with detailed FEA models to determine accurate responses of real-world systems.

**Dynamic analyses** to determine the response of dynamic systems:

- Modal
- Harmonic
- Transient
- Response Spectrum
- Multibody dynamics



# SIMULATING REALITY WITH ANALYSIS - Design & Optimisation

#### **Generative Design**

Whether for material efficiency, weight reduction, or stiffness optimization, we can used generative design tools to quickly improve the performance of your design.



#### **Design Code Assessment**

We work with many of the standard codes of design for structures, piping, pressure vessels and beyond, including standard from ASME, API, DNV, and many more.



#### **Multibody dynamics**

Here we can perform early system level design validation, representing the interactions between the components of the system including gears, belts, cables, motors and cams.





#### Fatigue, Damage Tolerance, Fracture and Failure

We allow our clients to determine the life of a product or system virtually and make and review design changes before any physical testing is undertaken, reducing development costs and accelerating the product development lead time.



# SIMULATING REALITY WITH ANALYSIS – DOCAN Customisation

#### **DOCAN Stress Engineering Tools (DSET)**

DOCAN have developed processes to automate aspects of our simulation and analysis work. These applications improve working efficiency and can be tailored to our client's requirements to offer them the same benefits.







#### Training

DOCAN engineers have a proven track record for providing simulation theory and software specific training courses. Whether you want to gain more experience with a given software package or understand more about the underlying processes of your work, we can provide tailored training and provide hands on experience to get you up to speed and operational in an efficient manner.



# SIMULATING REALITY WITH ANALYSIS – Non-linear

#### **Non-linear Simulation and Analysis**

Non-linear simulations can account for real world effects that are not possible to model with linear analysis. Highly complex, intricate non-linear analysis forms the bread and butter of DOCAN's simulation-based consultancy work.

Some of the phenomena that non-linear simulation can capture are:

- The response of materials such as metallics with plasticity, soils, concretes, plastics, and hyperelastics.
- Inclusion of contact, friction, and changing load transfer paths under large geometric deformations.
- Ratcheting of systems under cyclic loading.



![](_page_10_Picture_8.jpeg)

#### **Explicit FEA**

Explicit FEA methods are used for simulating shortduration events like impact and crash, and to analyze the complex nonlinear behavior that structures undergo during these events.

Our expertise allows our clients to study the structural integrity of their designs under these highly non-linear situations.

![](_page_10_Picture_12.jpeg)

# **SIMULATING REALITY WITH ANALYSIS – Fluid Dynamics**

- DOCAN have the tools and expertise to simulate a wide range of thermo-fluid engineering problems.
- Global network models and full 3D CFD can be used to represent complex fluid flow, characteristics of a piece of equipment are required for inputs, or the wind load imparted on an entire building.
- We use cutting edge CFD software which offer a series of practical, state-of-the-art CFD simulation and visualization tools.
- Our CFD tools can incorporate Multiphysics cosimulation to achieve couplings with Structural, Acoustic, Electromagnetic, Mechanical, One-Dimensional, Optimization, Thermal Environment, 3D CAD and other relative analysis tools, to improve the accuracy of the simulations.

![](_page_11_Figure_5.jpeg)

![](_page_11_Figure_6.jpeg)

# **SIMULATING REALITY WITH ANALYSIS – Fluid Dynamics**

- Using co-simulation within our suite of software, effective Fluid Structure Interactions can be simulated, where the response of a structure to the fluid flow has an impact of the fluid flow until an equilibrium state is met, whether that is steady state or oscillatory.
- With our CFD software we can model effects such as cavitation, aeroelasticity and erosion whether that pertains to equipment, buildings or land. This can be applied to model full HVAC responses, hydroelectric facilities, or piping networks.

![](_page_12_Picture_3.jpeg)

![](_page_12_Picture_4.jpeg)

![](_page_12_Picture_5.jpeg)

# SOFTWARE

We employ a wide range of tools and software packages across our consultancy business.

We have formed partnerships with world leading software houses which enables us to offer you cutting edge software. We also have acquired additional tools to support our consultancy work as needed.

Here are some of the tools available to us:

### **COMPLETE SIMULATION & ANALYSIS** TOOLS

- MSC SOFTWARE\* (INC. MSC NASTRAN, PATRAN, ADAMS, CAE FATIGUE, CRADLE CFD, AND MANY MORE)
- ALSO INCLUDES ABAQUS, ANSYS, AND OTHER PACKAGES AS DESIRED BY THE CLIENT.

For FEA & CFD, acoustics, fluid-structure interaction, multi-physics, fatigue and durability, multi-body dynamics, and more.

### **HPC & CLOUD COMPUTING**

- **RESCALE**\*
- IN HOUSE HPC'S

**Providing HPC resource solutions.** 

### 2D DRAFTING & 3D CAD

- BRICSCAD\*
- **SOLIDWORKS**
- AND OTHER HIGH-LEVEL PACKAGES

Covering basic 2D drafting through to complex 3D modelling and engineering drawings for all industries.

### **PRESSURE SYSTEMS**

- ROHR2\*
- CAESARII
- PV ELITE & CODE CALC
- TANK

Static and dynamic analysis of pressure systems for piping, vessels and pipeline systems.

### **1D SYSTEMS ANALYSIS** • FLOWNEX\*

1 dimensional thermo fluid system modeler and solver with capabilities to handle flows of pure liquids or gases, mixed flows, compressible and incompressible fluids, incondensable, two-phase, and slurry flows.

### ENGINEERING MATHEMATICS & AUTOMATION

- MAPLE\*
- MATHCAD
- MATLAB
- FORTRAN, C++, PYTHON

Analyzing, exploring, and solving mathematical problems.

![](_page_13_Picture_32.jpeg)

### CAN'T SEE WHAT YOU'RE LOOKING FOR...?

CONTACT US TO ENQUIRE ABOUT YOUR SPECIFIC CONSULTANCY REQUIREMENTS WWW.DOCANCO.COM

### SUMMARY

### **OUR BUSINESS IS SPLIT INTO TWO DISCREET DIRECTORATES.**

- Engineering Consultancy
- CAE Software Distribution

### CAE SOFTWARE DISTRIBUTION.

- Tools to tackle a wide variety problems across engineering disciplines
  - Design and Manufacture
  - Structural Mechanics
  - Fluid Dynamics
  - Mathematics and automation
  - and many more...

### **ENGINEERING CONSULTANCY.**

- At DOCAN we have a wide range of skills, experience and people.
- Core team and Associate engineers.
- Experience in industries including Oil & Gas, Drilling (Onshore/Offshore), Renewables, Aerospace, Nuclear, Power Generation, Manufacturing, Non-linear Simulation, and more...

### **OUR KEY AREAS OF EXPERTISE ARE:**

- Engineering Design & Assessment
- Engineering Simulation & Analysis Expertise
- Training Services for Design & Simulation
- Term Contracting Supplier
- Expert and 3<sup>rd</sup> Party Reviews

![](_page_14_Picture_21.jpeg)

# **CONTACT US**

CALL - UK +44 (0)1606 212330 - USA +1 888 874 0964 EMAIL - INFO@DOCANCO.COM WEBSITE -<u>WWW.DOCANCO.COM</u> OR FOLLOW US ON LINKEDIN <u>WWW.LINKEDIN.COM/COMPANY/DOCAN/</u>

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![](_page_15_Picture_3.jpeg)

![](_page_15_Picture_4.jpeg)