

SIMULATION

FEA/CFD

FINITE ELEMENT ANALYSIS (FEA)

What is it?

It is the digital testing of products used to test all sorts of mechanical components from pipelines to controlled car crashes. It is also referred to as Digital Prototyping and allows conceptual designs (new designs) the ability to be virtually tested before they are built.

Industrial designers, manufacturers and engineers use Digital Prototyping to design, test, optimise, validate and visualise their products digitally throughout the product development process.

FINITE ELEMENT ANALYSIS (FEA)

What is it continued...

Innovative digital prototypes can be created via CAD to meet multiple-design objectives (such as maximised output, energy efficiency, highest speed and cost-effectiveness) reducing development time and time-to-market. Marketers also use Digital Prototyping to create photorealistic renderings and animations of products prior to manufacturing. It gives product development teams a way to assess the operation of moving parts, to determine whether or not the product will fail and see how the various product components interact with others. **In a nutshell, FEA is determining how a solid body will respond to various forces applied to it.**

FINITE ELEMENT ANALYSIS (FEA)

How does it work?

The computer is able to analyse and calculate areas of a structure and determine how strong or weak each area is. It then adds all these areas together to give an all over strength/weakness for a given component.

FINITE ELEMENT ANALYSIS (FEA)

What benefits does it provide?

Instead of needing to build multiple physical prototypes and then testing them to see if they'll work, companies can conduct testing digitally throughout the process by using Digital Prototyping, reducing the number of physical prototypes needing to validate the design.

Using Digital Prototyping to catch design problems up front, manufacturers experience fewer changes downstream. Companies can also perform simulations in early stages of the product development cycle, so they avoid failure during testing or manufacturing phases.

COMPUTATIONAL FLUID DYNAMICS (CFD)

What is it?

CFD is a form of digitally testing airflow through the internals of a building and can be beneficial to Architects for the following reasons:

- It is a cost effective way of improving internal/external building design.
- The use of CFD can increase building design performance by establishing how the air flow through rooms is going to affect the people working/living in that area.
- It could be used to establish where to locate various furniture, heating systems, height of ceilings, etc.

COMPUTATIONAL FLUID DYNAMICS (CFD)

How does it work?

It shows Architects how the airflow through a design of, say an office could be detrimental to the workers, i.e. warm/cold areas thus allowing fact based decisions to be made, e.g. where to place duct venting, positions of internal walls and furniture, height of ceilings, etc.

As with FEA it uses complex mathematical formula to analyse and establish volumes and flow rates through confined areas.

COMPUTATIONAL FLUID DYNAMICS (CFD)

What benefits does it provide?

It instantaneously yields volume data which is useful to the overall design. It allows Architects to visualise and manipulate new building designs, determine heat flow and heat control and loss and the environmental efficiency of the build at an early stage.