

## **GOOD DESIGN and PRODUCTION WITH CAE ANALYSIS**

It is possible to make the products more easily producible, durable, ergonomic, reliable and less costly by using engineering analysis.

What is good design? Probably the most interesting answer to this question came from usability guru Mr. Steve Krug: "I can't define the good design and I can definitely know it when I see".

Good design is the one that leads the company towards their goal. "Good" changes according to sector, product type, person, etc. However to find a common ground is possible. Some criteria for defining the good design would be effectiveness, durability, aesthetic, usability, producibility, uniqueness, respect to environment and profitability.

A design should be beneficial, enduring and aesthetic. It should execute its engaged functions, fulfill expectations and satisfy its user with a convenient performance level. It should look good but "good looking" is something relative. Market conditions, life style, culture, age, education, gender, profession affect the factors of aesthetic. Besides the product has to keep its usability and functionality under hard working conditions.

### **Criteria for good design**

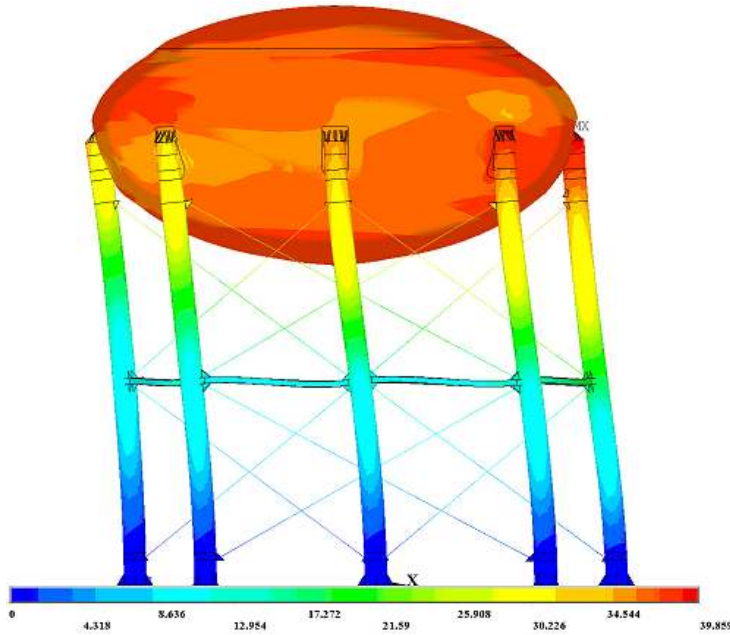
A good design, a part from being easily producible and mountable, should provide benefits for its user, fulfill the requirements of environment-friendly approach and create profit for its producer. Additionally, a good design is thought to be suitable for safe working, easy to test, maintain and transport and usable at international level.

Whatever the definition is attributed for good design, products that are delicately designed have crucial importance for the sustainability of the produces company's success. Most successful companies approach to their design in a holistic manner that include the functionality, performance, production, aesthetic, test, maintenance and ergonomics.

Creativity and Hard-Working are the most important factors that are always combined when creating a good design. In our era a new concept has been added in this creation process: Engineering Analyses. In this context we will get into details pf how the engineering analyses contribute to good design.



Advanced engineering applications are carried out to determine the behavior of a designed object against internal and external impacts, by forming and solving its 3D numerical mesh with numerical method appropriate to the kind of analysis. In another sense it is virtual reality. With a good design that is finalized with appropriate and sufficient advanced engineering application there is **no surprise** after the production, **no waste** of material, **no missing** function and **no need** for an experimental study or physical prototype.



### What is “engineering analyses”?

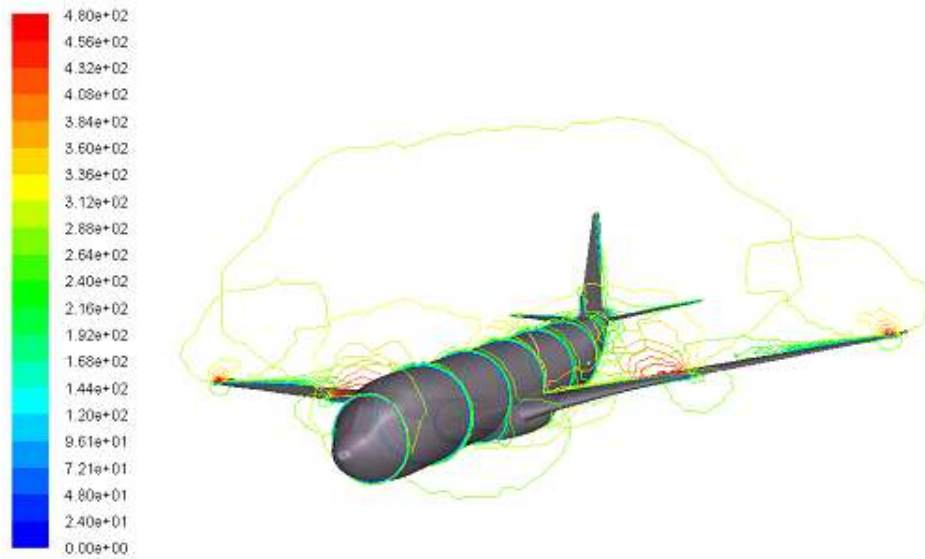
- They are modeling and simulation applications to control the complexity.
- They are methods to reach the desired sensitivity, correctness, performance and all other targets quickly and cheaply.
- They are attempts to include the particulars that make a design “good”.

### What are included in engineering analyses?

- Finite Element Analysis (FEA)
- Computational Fluid Dynamic Analysis (CFD)
- Fluid-Structure Interaction Analysis
- Vibro-Acoustics Noise Analysis

Today, for many manufacturing company, engineering analyses have become a standard need. The argument is not about the benefits of these methods anymore but how they can be used more widely.





Contours of Velocity Magnitude (m/s)

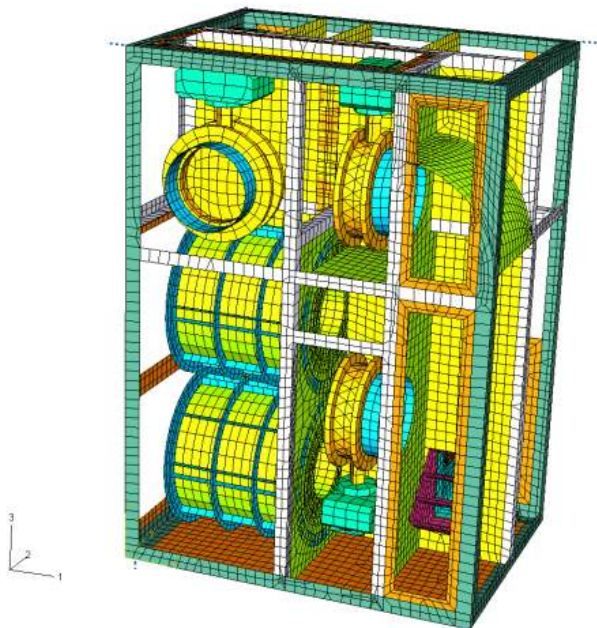
Jul 07, 2010  
FLUENT 6.3 (3d, pbns, S-A)

### What are the benefits of CAE Analyses?

The possibility to make calculations that are impossible to be done by hand increase the importance of computer aided analyses. Fundamental benefits are as follows;

- Verification of design concept and production processes
- Less need for modification at matured design stages
- Saving in terms of weight and cost in a product
- Visualization of the design via simulation
- Predicting the product's functions in real environment
- Minimizing the need for experimental test and physical prototype
- Decreasing the design cycle time
- Decreasing the design cost

Engineering analyses have become an indispensable tool for every company that understood these benefits.



In order to minimize the risks and prevent errors these analyses should be carried out by experts engineers who have been trained in related fields. Especially for some products such as ship, airplane, skyscraper for which physical prototype testing is nearly impossible, such calculations are of very high importance.

When improving a product or developing a new one major requirements are economy, functionality, respect to environment, safety, performance, aesthetic and ergonomics. By using engineering analyses it is possible to make the products more easily producible, durable, ergonomic, reliable and less costly. Therefore producer Company would be able to respond customers' requests faster, decrease risks with error detection at design stage, develop methods to lower the production costs, create innovations that brings competitive advantages and form a vast engineering knowledge. Moreover all these gains will help the company to realize a sustainable growth.

