

# THE APPLICABILITY OF SIMULATION-DRIVEN DESIGN

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## Public Summary

Enginia is a company that sells 3D CAD and FEA software among other things. The market for 3D CAD is getting saturated and to retain market share, they want more information about the influences of simulation-driven design, the start of simulation early on in the design process. Simulation-driven design is used to synthesise and define the design instead of to evaluate and validate the design, the way most simulations are used now. “Analysts can use the direct geometry editing capabilities to create design variables which can be optimised for any kinds of simulation.” (Siemens 2015) In figure 1 is shown, how the possibility to influence the costs declines during the phases of the design process. Simulation early in the design process can help to make better decisions, but then the problem is that the knowledge about the final geometry of the product is deficient at the beginning of the design process.

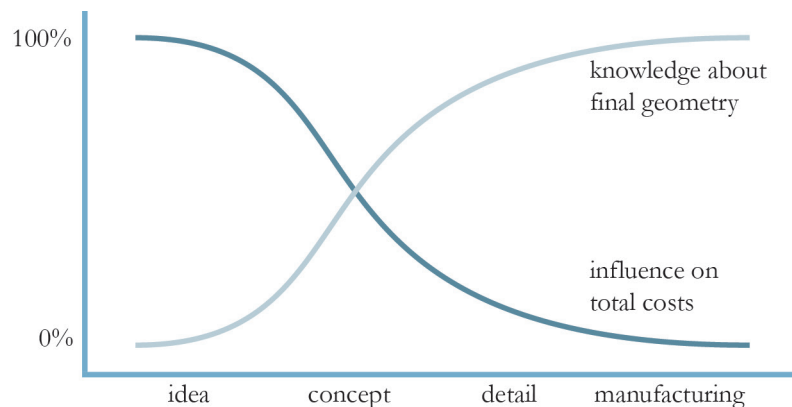


Figure 1: Geometry knowledge versus influence on costs

The goal of this project is to describe how simulation-driven design is practically applicable for customers of Enginia. The following research question has been drawn up for this:

### **How is simulation-driven design practically applicable for customers of Enginia?**

Research into simulation software resulted in an overview of strategies that are available in software, which can be used for simulation-driven design. These strategies were divided into three categories;

- rapid acquiring FEA skills,
- simulating with simplified models,
- computer generated models.

Not every strategy is applicable to every company, and some strategies are already broadly used. Still, there are strategies that can help many companies to improve their design process.

During conversations with engineers from different companies, the way that simulation is applied at different companies was shown. Looking for a way to apply the strategies above, it came to the attention that simulation-driven design can add a different value to every company. Another significant finding was that applying simulation-driven design is often an idea brought up by engineers and not a management decision.

The information gained from both the software research and the conversations result in a list of steps that have to be taken to convince a company to use simulation-driven design.

#### **Awareness**

The first thing to convince a company to use simulation-driven design is to inform the company about this theory. Most companies have not heard about simulation-driven design before, and if they do, they mostly don't have an idea about the all the possibilities.

#### **Gathering information**

The next step is to get insight into a couple of factors of a company. Information about the current design process, workflow, employees, products and revenue says something about the applicability of simulation-driven design.

#### **Added value**

With the help of the factors of a company, something can be said about the way that simulation-driven design can add value to the design process. The application of simulation-driven design

leads to shorter project times, better division of workload, less rejected projects at validation, better quality products, less material, space and mass used. However, not all of those benefits are equally valuable for every company.

### Process changes

An obvious change in the design process will be the moment of simulation. Nevertheless, the tasks that one person executes will also change. To get a clear overview of this, the whole design process has to be evaluated. There are different ways that simulation can be embedded in the design process, as shown in figure 2. In the optimal use of simulation-driven design, all the simulations during the design process are executed by design engineers. In this way, the design engineer does not have to wait for a simulation expert to go further with the project, and at the same time, he gets more insight into the project.

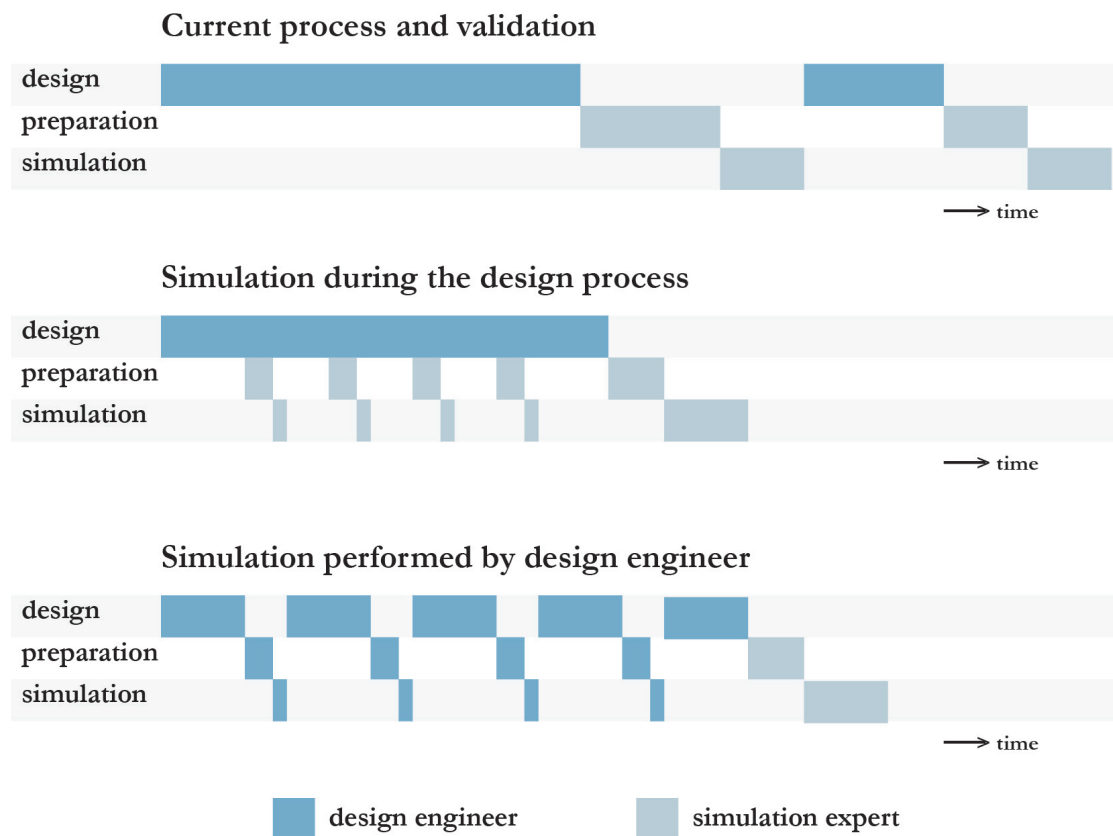


Figure 2: Simulation in the design process

### Investments and returns

To convince a company that simulation-driven design will be profitable for the company a business case will be set up. The investments and returns are elaborated above, an overview is given in figure 3.

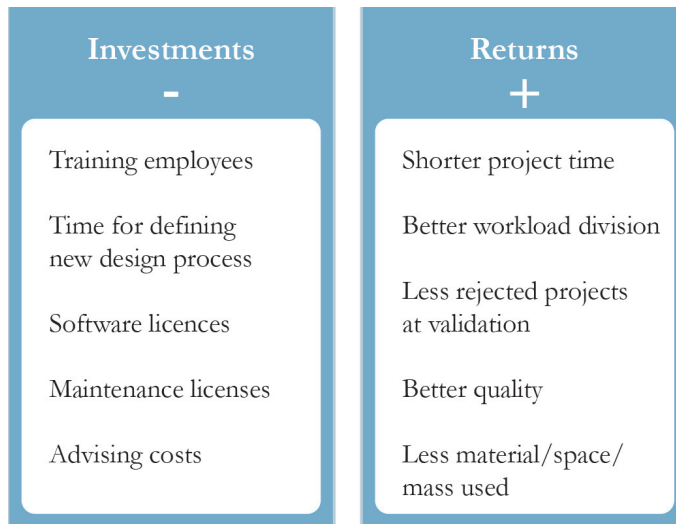


Figure 11: An overview of investments and returns.

With more companies using simulation-driven design, more design engineers will be simulating. Enginia can sell more simulation licenses, training and support contracts. Their engineering department can advise companies on how to apply simulation-driven design, and the workload of this team will be more divided over the overall project of the customer.

To go further after this project Enginia could set up a case study. In this way, Enginia gains experience with implementing simulation-driven design and a case study will convince other customers to implement simulation-driven design as well.

Siemens, P. S. (2015). "NX CAE Advanced simulation solutions to drive smarter product decisions."