ABOUT SIMULATIONXPRESS MODULE FEATURES

prof.PhD.eng., Cătălin IANCU,
Engineering Faculty,"C-tin Brâncuşi" Univ. of Tg-Jiu, ciancu@utgjiu.ro

Abstract: *In this paper are presented the analysis steps to be taken in SolidWorks for conducting a preliminary study of parts designed, using SimulationExpress module. There are presented the software features and the settings that have to be done for such analysis and the results shown after analysis.*

Keywords: SolidWorks, SimulationExpress, stress distribution, displacement distribution.

1. INTRODUCTION

SolidWorks SimulationExpress Module "offers an easy-to-use first pass stress analysis tool for SolidWorks users. SimulationXpress can help you reduce cost and time-to-market by testing your designs on the computer instead of expensive and time-consuming field tests" [1].

Without simulation tools, the questions about the best part design can be answered only by expensive and time-consuming product development cycles that typically include the following steps:

- build your model in the SolidWorks CAD system.
- prototype the design.
- test the prototype in the field.
- evaluate the results of the field tests.
- modify the design based on the field test results.

This process can continue until a satisfactory solution is reached. So by using *SimulationExpress*/*Simulation* one can accomplish tasks like reducing cost by testing the model using the computer rather than field tests, reducing time to market by reducing the number of product development cycles and optimize the designs by simulating concepts and scenarios before making final decisions.

Two modules are available: *SolidWorks SimulationXpress* that handles part documents (solid bodies only) and is included in the core software, and *SolidWorks Simulation* that handles parts and assemblies, which is available as a separate product. The second module includes configuration support and expanded options.

To begin working with SimulationExpress, open a part and click one of the following: SimulationExpress icon  (Tools toolbar or Evaluate CommandManager tab) or menu Tools > SimulationExpress.

Figure 1. SimulationExpress icon for beginning analysis

The wizard interface of SimulationXpress uses elements of the full Simulation interface to guide you through a step-by-step process to specify fixtures, loads, material, run the simulation, and view the results.

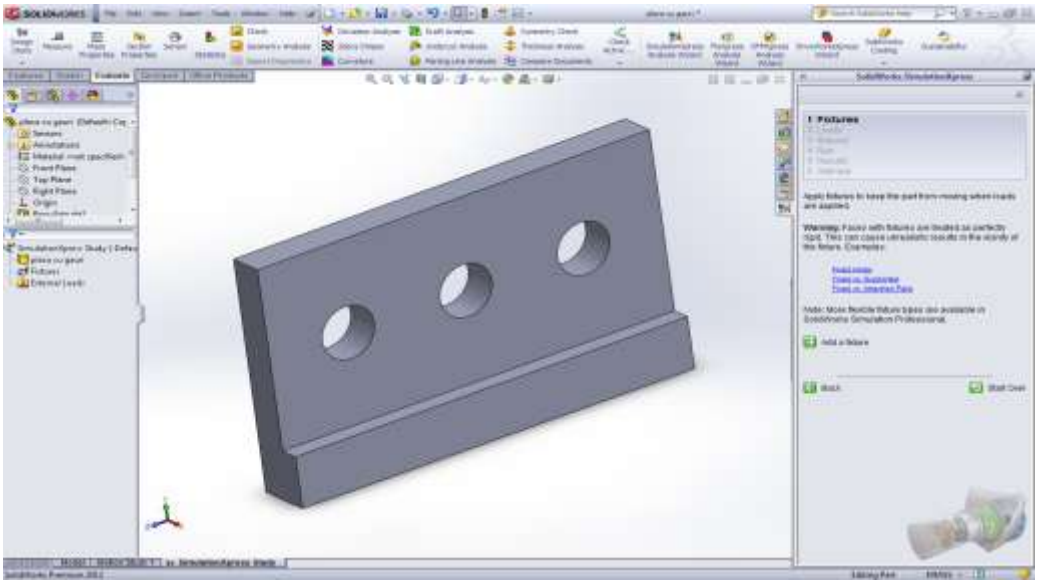

Figure 2. SimulationExpress manager interface

2. SIMULATIONEXPRESS TASK PANE

When you have a part open, the SimulationExpress Task Pane appears in the right side of working board to let you begin the step-by-step process of analysis, as shown in figure 2.

2.1. Fixtures

In this step it's applied fixtures to faces or edges of the part.

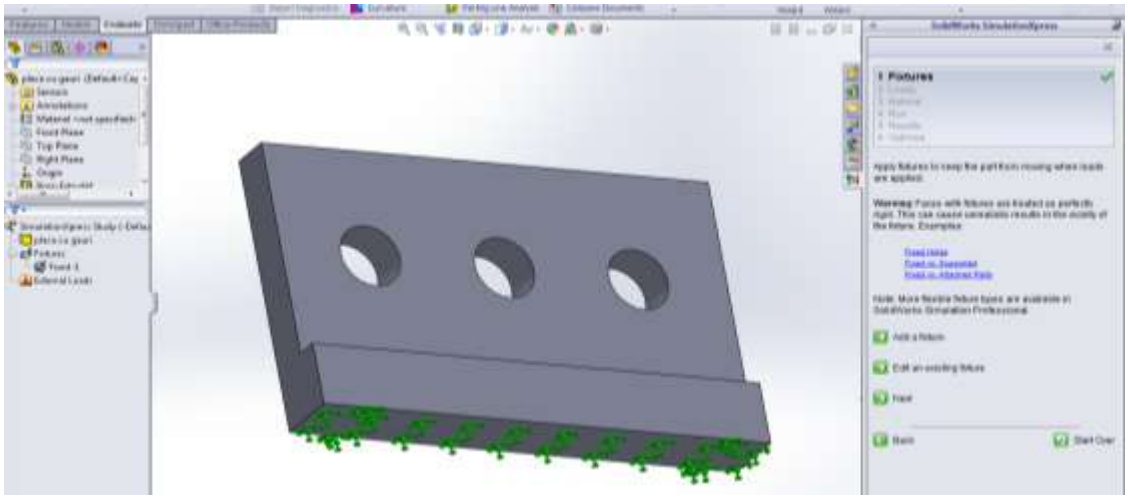

Figure 3. Fixtures applied to part

2.2. Loads

In this step are applied forces, pressures, or both to faces of the part.

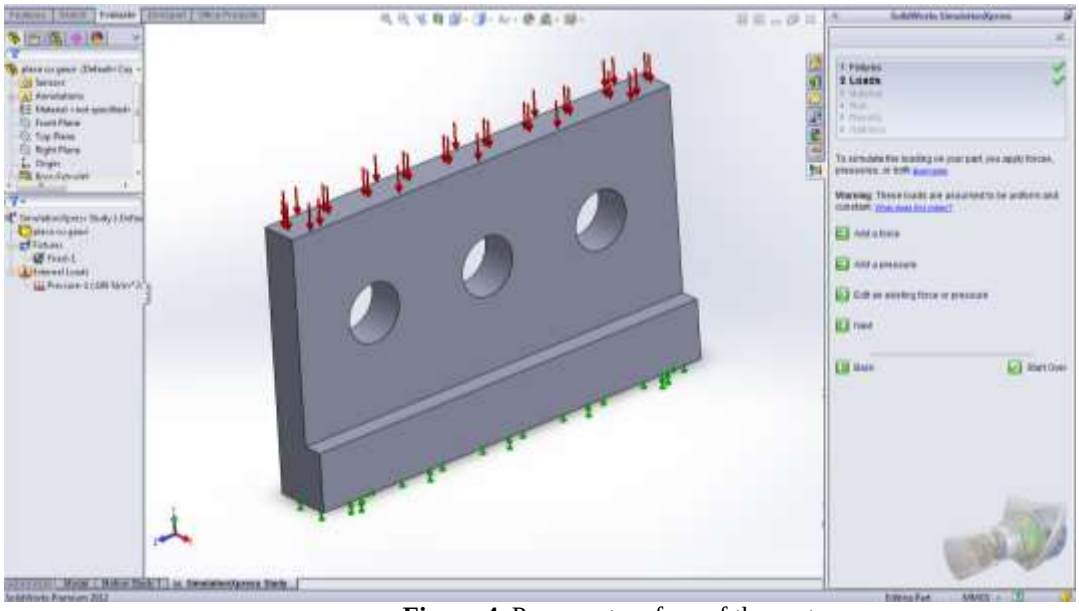

Figure 4. Pressure to a face of the part

2.3. Material

In this step it is assigned material properties to the part, by choosing one material from library or by defining individual properties.

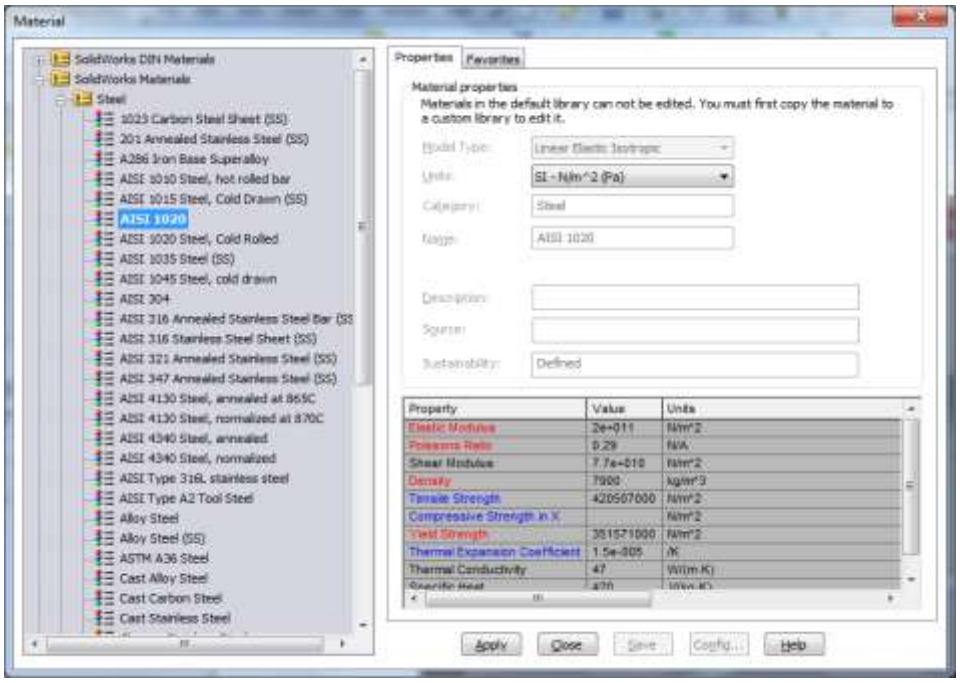

Figure 5. Choosing material for the part

2.4. Run

Uses the default settings or changed settings for the simulation and run analysis.

Practically it's done a static analysis by FEM of studied part, with default settings for the type of finite element and mesh density [2]. One can use changed settings (figure 6), as described in [3].

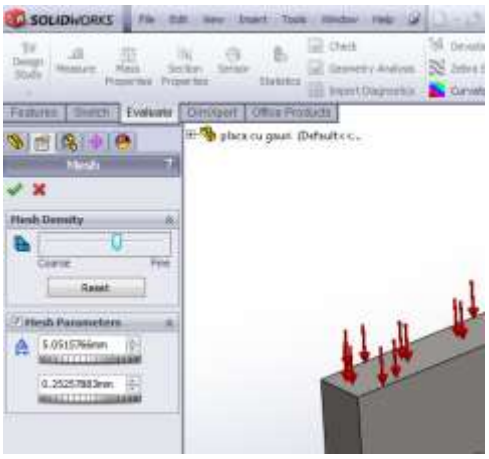

Figure 6. Adjusting mesh settings

2.5. Results

After the running analysis it can be displayed simulation results as:

- animation of the part as it stretches under the load (fig.7);

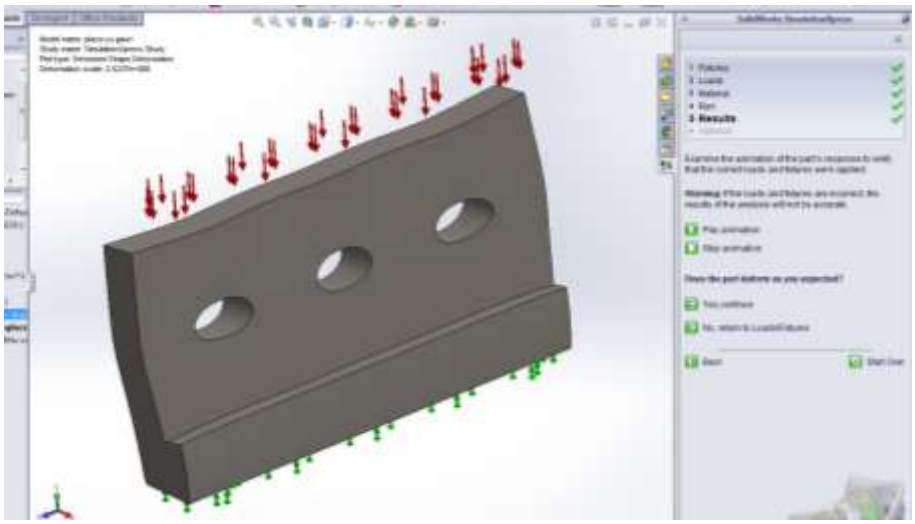

Figure 7. Animation of model

At this stage if the model doesn't deform as expected one can return to the very first step of simulation for various modification.

Other simulation results that can be displayed are:

- deformed shape of the model (fig.8);
- VonMises stress distribution in the model with or without annotation for the maximum and

minimum stress values (fig.9);
- resultant displacement distribution in the model with or without annotation for the maximum and minimum displacement values (fig.10);
- critical areas where the safety factor is less than a specified value (fig.11).

Also can be generated a report or a SolidWorks eDrawings file for the simulation results.

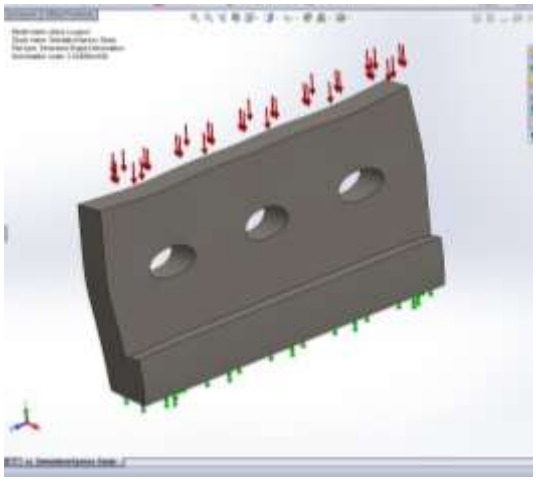

Figure 8. Deformed shape

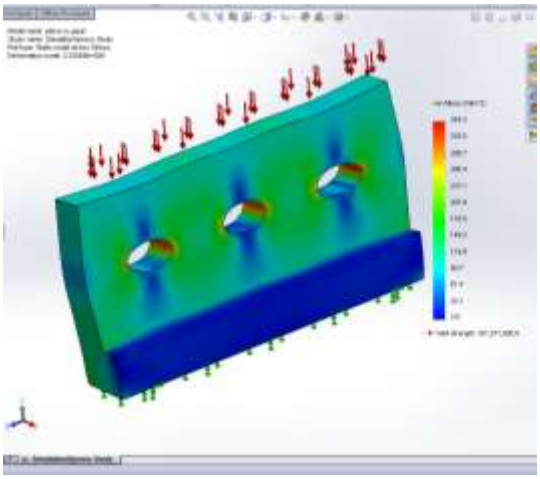

Figure 9. Stress distribution

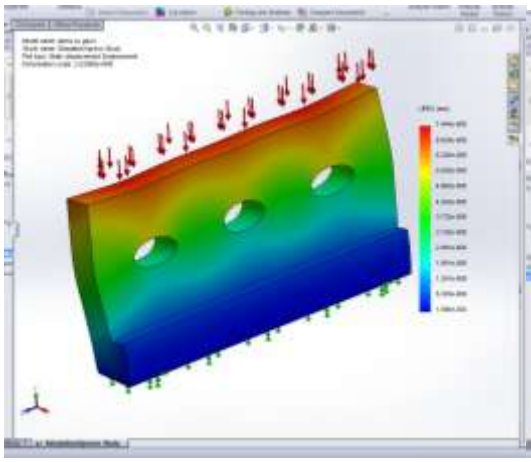

Figure 10. Displacement distribution

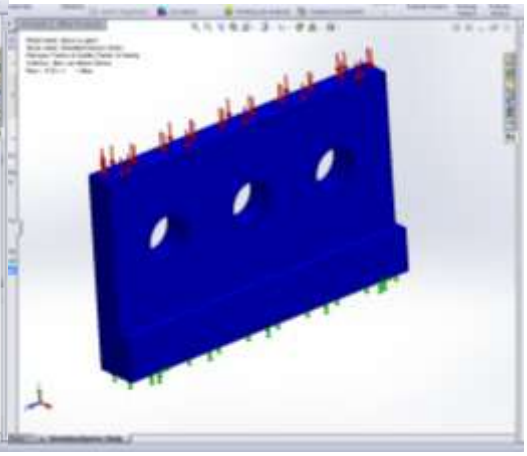

Figure 11. Safety factor distribution

2.6. Optimize

This option allows optimization of a model dimension based on a specified criterion and constraint. Practically it's done a dimensional optimization not a shape one, using as objective function minimization of mass [4]. It must be defined several parameters to be used as design variables, as shown in figure 12. However, the problem of optimization is more complex and exceeds the goals of present paper, and will be presented in a further paperwork.

Figure 12. Defining parameters for optimization

3. CONCLUSIONS

By following the steps and the settings described in this paper, as stated in [1], one can perform a study using *SimulationExpress*, that can lead to reducing time to market by reducing the number of product development cycles and even optimize the design and also like reducing cost by testing the model using the computer, rather than field tests.

For extended study one can use *SolidWorks Simulation* that handles parts and assemblies also, which is available as a separate product that includes configuration support and expanded options. This is useful both in terms of time and money leading indirectly to better sustainability of products designed.**BIBLIOGRAPHY**

[1]. *SolidWorks user help*, Dassault Systèmes SolidWorks Corporation, Waltham, MA, USA, 2012.
[2]. Imbert, J.F., *Analyse de structure par elements finis*, 3e ed., Ecole Nationale Superieure de l'Aeronautique et de l'Espace, Cepadues-Edition, Toulouse, France, 1995.
[3]. Iancu, C., *Contributions to dimensional optimization of mechanical press in dynamic regime*, Ph.D. Thesis, University of Pitesti, Romania, 2002.
[4]. Iancu, C., *Dimensional optimization of mechanical press*, Ed. MJM, Craiova, Romania, 2002.