

Finite Element Analysis in Structural Engineering

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Introduction

The abbreviation means analysis of FEA's final elements. In principle, FEA – A numerical method is used to solve engineering problems in the area, through the area in which the lower end of some of the subfields occurs when the range of specific elements, to which the algebraic equations apply, is accelerated using method difference. Reassembled results for each resemblance element and any number to analyze complex engineering problems with this method, and a powerful referee can run different types of analysis. The main method of solving the problem with the use of VEA can be shared in a number of steps. Initially, the problem must be identified and classified. There are different types of analysis that can be done. It is important to choose the right analysis of the correct problem. Then, the analysis should be obtained from a simplified mathematical model to establish basic physical concepts. Then, get an analysis of a solution to help restore the desired outcome after the FEA study. The next step is to analyze the crude elements, that are almost always done with the computer. The final step is to check the results. First of all, if the “look” results are correct, it is important that they are logical, and they should be similar to the preliminary analysis. You may have to check the results against other forms of the solution or against the physical model [Cook]. It should also be noted that the VED process is a highly repetitive process. Finally, the first foreign trade work is rare, and after showing the results of the work, it is necessary to review it frequently.

The thesis is focused on the structural analysis of a certain part of a warehouse building. The parts involved include roof scissors, columns and sections of the structure. Some of the selected buildings were considered to be the most important, especially due to the loading conditions. The three main forces that influenced the structure were snow load, wind load and weight of work. The main purpose of the analysis was to identify parts of the building that have great suffering. Until recently, the analysis of complex structures has been complicated and consumed in due course. Development loans exclusively granted to powerful computers and research, effective analysis methods.

This dissertation is the method of selection of the final element method. The method investigated the most sensitive parts due to stress. This type of analysis simplified the problem to see the big picture. Then the analysis of the assembly data was analyzed and analyzed. For example, initially analyzing scissors and colon, and then some members of the cell have been independently audited. To reduce stress levels, part of the open structure was processed with a high voltage. For example, to change the properties of cross-sectional scissor elements that increase the second minute of the field. The type of material used in the rays was changed to increase stiffness. Therefore, the analysis showed

the most sensitive parts due to high voltage. The next step was to define the members and manipulate the design to deal with extreme stress. The analysis covers most of the restrictions, and the most important is. There were many dependent steps in the analysis. Ninety percent of the construction revealed that there was great stress. The redesign is crucial to supporting analysis.

The aim of the thesis is to improve the design of the store. Structural analysis is important, as long as the reliability of the investigation structure is. Can the building be based on loading conditions? This is the question asked during most of the analysis. Structural analysis is important as it defines vital sections that require special attention. The analysis also helps to understand the structure of the structure more. Each assembly department has one goal and must be defined before any changes are made. One and two of the following figures show a physical reality, including internal parts analyzed. The structure to be analyzed is a warehouse used for the storage of agricultural machinery and products. The building has a lot of stress in different parts due to different loading conditions. It is not inappropriate to analyze the building as a whole. For more details, the structure is divided into smaller pieces for easier inspection. In addition, different parts of the building are more important than others. It is assumed that the roof scissors, the pylon supports and the sections are the most important parts of this thesis. Technical drawings of the building. This technical drawing is shaped in the CAD software, and the analysis is done later.

A Brief Introduction To The Analysis

The method of analysis used is very important since the results are not completely dependent on the procedure used to study it. If this review is handled, it can be a complex task and error-prone. For this reason, the final element (FEA) method was used for this analysis. This method is a convenient and fast way to make a structural analysis. The software to make the real thing duplicate is single drawings of the structures to be analyzed. The software also modifies power and limitations. The other four digits show the difference between the actual structure and the shaped structure. Return model of the train back. The simulation involves drawing in computer software. The most important information in the models includes the properties of the article, the courtyard, and the strengths and constraints of the structure (border conditions). However, be careful in this process because the incorrect molding of software structures may result in accumulated errors. The next step is the model that simulates to find the results. The results show tension, buckle and relocation of the model Von Mises. Figure 5 shows an example of a simulated model. The results are shown graphically. Displays high voltage or displacement, shows low voltage blue or displacement.

Many are moving along the structure from many directions. Sometimes, the download works individually and sometimes at the same time. The worst value conditions, which arise from the highest stress, are used to take the analysis. For additional analysis, the extraction of higher shock stresses of Von-Mises or structure fragments with high bending.

Design principles, which are used mainly in this analysis, include the following information:

- Statistics
- Power of contents
- Elements of the machine
- Subject selection
- End method of mechanical engineers

The analysis then adds new designs to check if the high voltage is reduced. Reorganization of participants is an important part of the analysis. The simulation involves drawing in computer software. The most important information in the models includes the properties of the article, the courtyard, and the strengths and constraints of the structure (border conditions). However, be careful in this process because the incorrect molding of software structures may result in accumulated errors. The next step is the model that simulates to find the results. The results show tension, buckle and relocation of the model Von Mises. Figure 5 shows an example of a simulated model. The results are shown graphically. Displays high voltage or displacement, shows low voltage blue or displacement.

Expected Challenges

Even with very complex computer software, the analysis process is not clear. The two main problems are the high accuracy and consistency of the procedures. Each result must be logical and realistic. Very strange results and results are found if you are not careful. Contemporary sentences should always be remembered when “garbage litter” software is used. Therefore, the difficulty in understanding the difficulties in advance is the need to handle them when necessary. It is very important that the level of accuracy of the thesis is still high. As mentioned earlier, due to the accumulated errors, there are wrong results and incorrect projects. There are many instances that may cause the recycling to be analyzed. For example, during modeling, some data may be omitted from the drawings that, affect the final results.

All steps are checked twice to ensure everything is right. The power of simple computers allows for increasing the level of accuracy. The results should be reasonable to increase the level of confidence. The problem-solving method should be the same in the analysis, as it is easier to compare results and projects. For example, the units used at the beginning of the analysis should be used during the thesis research. If English units are used in the calculation, and all others use the metric unit, this may be disastrous. It is important to avoid mistakes and have good consistency during this thesis’s research.

The Finite Element Method

There are physical problems, for example, in different engineering categories: Solid and liquid

mechanics, electronics, dynamics and thermodynamics. The numerical analysis method used by engineers is to solve differential equations that explain the best physical models. The final element (FEA) method used to solve physical problems is an example of numerical mode.

FEA analysis can be used in many areas. Some of the areas:

- Structural analysis (stress, stress, bending and methods)

- Temperature analysis

- Magnetic and electricity analysis

Shaping pressure

- Related problems (leaving a wind load in the building)

In structural analysis, FEA is used to investigate how functional forces will affect product design. Complex structures are analyzed better by FEA because they do not find resolution manuals. Since the FEA method requires many simultaneous equations to be solved, very powerful computers are needed. The building's building is a complex structure. Due to complicated dwellings with complex load conditions and geometry, calculations that give direct solutions to analysis are impossible. This is why numerical methods, such as FEA, are used to get solutions. Place. The purple elements are combined again to find the final solution around the entire structure. Demonstrates a true physical object and triggering model, separated by elements of a limited element. The results of the FEA software are well illustrated and easily. However, the results should be checked twice.

The procedures of the numerical method include the provision of a series of approximations through a reconstruction procedure. In short, such as calculus, basic mathematical problems cannot be solved directly. Numerical methods are used to show a solution approach. This is not only basic information on the mathematical theory of the theory of crude elements. The focus is not on how the software is used but on the theoretical background of FEA. There is an increasing trend in structure shaping, and FEA is the biggest reason for this possibility. Modulation is crucial when new projects are being tested. Since the actual design (prototype) is not actually produced and tested, it will reduce the cost of testing. Therefore, the FEA method is only useful in analysis, but it can also test new models in simulations. FEA involves sharing the problem in small features and finding individual solutions. The features relate to nod points, and the boundary conditions are clearly defined at the beginning. Notes can be transferred, rotated or set, and this can be clearly identified when the structure is shaped. If the nodes are subject to disinfection, the elements also change.

FEA Computer Software

There are many computer programs that make a structural analysis. The programs are divided into two: small special programs and heavy commercial programs. Special programs are designed to solve

problems and cannot solve different problems. These programs are cheaper and more widely available. On the other hand, commercial programs can solve a wide range of problems and model design. In this thesis, due to the complexity of the analysis, the two types of commercial programs are often used. It is a Math-what-based program and demonstrates the programs used. The smallest program used is the Mathcad database developed by teacher HAMK Esa Murtola. There are some other commercial programs that can be used to make the same analysis. These include:

- ANSYS
- Abaqus
- ANSA
- ALGOR

FEA Analysis Procedure

The following steps are done when they use Creo Simulate FEA software.

Cr Creo's parametric geometry creation (CAD software)

Transfer To Creo Simulation

Sim Sampling parameters (relevant properties, similar constraints
and loads)

Show Results of Desire When the final results are calculated, it is important to ensure that the results are correct. This check is done through a procedure called convergence analysis. Convergence uses the same problem to determine what results are right and to look at different results for adoption. The method used to analyze convergence recognizes two FEA programs. A group of elements is used and uses the other p-elements for convergence. When you use p-Creo-Simulation elements, other programs, such as ANSYS, use the elements to analyze convergence.

Before starting the construction of planning, what ultimately distinguishes others in the industry is a plant. We will give you the balance that you are looking for, a competitive advantage because of its efficient operation. Following the layout elements that should not be allowed to solve the problems possibly Awakened from the construction or at the moment or, worse, when you are operational.

Remember the mistake diligently.

Beyond being a subject of stones,

- We agree with the office supplies, and the undergraduate room does not have a number.
- Does the receptionist on the floor of the room development layers, as in the closets, understand that?
- Do you have employees to go to the locker? Does space not allow it?

How many hours are spent at the front end of a sorting process to develop an effective layout to match exactly? Time is the best chance for a successful layout. There was a certain day you would be on the board. The importance of the initial training time spends a lot of time is their faith before arriving at the layout, and they work. Do not forget the offices and production areas in the developer support. The more they practice, and even seems to be the apple basket if you are now looking for the word, although we are for the first time. If you are looking for and I will break the functionality of these places that I will deal with them, have a negative impact on the surrounding areas. This important document. At first, the game is the risk advice of the warehouse to find the answer that it is very, areas or sections of these parents to me, that they should not since the extension of the plans. This tool cannot be flexible in terms of the expansion energy curve of their fetuses, and does not affect the rope, but when you think of all the parts at all together. See your parts of the pain of the adjacent steps (form) (1) there are areas that may be insufficient? (2) If the injury of the extended sections or areas does not be? Moreover, if it happened to have in order to avoid again back to their worthy to untie. They were told that all stages of the process could be carried out only after the connection of confidence in justice. And remember, this exercise is a lot cheaper than the construction changes that are occurring.

But it is difficult from the point of view. "Columns. Sad and hardware that does not work through it, and steel columns. With equipment that is "smart" because it certainly measures the entire operating distance, including the overall equipment of the system area and the equipment needed so that it is running around (Solaris, staging, work tables, etc.) It will lead to the assumption that there is no construction column on a measuring grid 30'x 40. In fact, we have some flexibility. As long as a minimum of space cannot be less than 25 feet, to avoid a lot of pillars, and they were far from being at most 45 feet, they do not start paying in the iron and rewards. Drag the column from the layout where you can see this is preferred by preventing the transparent material. Departments must maintain the consumer equipment and the flow of good judgment. It will take a while; be patient. (built) home and watch for a long time and spend time at this stage to be very useful.

Conclusion

Some members of the building are subject to undesirable stress and defects. While these values fail, they need again to increase levels of reliability in terms of power. To increase power, two elements of building elements need to be changed. The only element (E) consists of the material, and the other part of the beam (I) is the cross-section of the function. They show the beam rigidity. Increase the

rigidity when the tension of the beams reduces bending. The material used for the beams in the building is structured steel (S355). The material is relatively permanent and hard, with a high modality of young fashion. At the same time, it is cheap and affordable, making it an economic advantage for use in this warehouse building. There are other types of material that have a higher strength and stiffness than structural steel. The material has higher weight ratios than the material used in this building. However, these materials are much more expensive than structural steel, and economically, they are not wise to use them in construction. The table below shows the difference in prices for high-strength metals. One by one, for the most part, was given the most emphasis on this approach before the end of the study when designing the institution's responsibility. True, this intention of an agricultural developer. Often neglected were in the tumult of ships, having received the new kind of an impression of his station. But all this is far from glamorous as you look at the question of the role of the sole of the whole in almost the incomes, the most important of the whole building, go there the door of the vertical pipes ships is in you. The same attention to detail in one of the necessary size boats and the location of attractions (the same power and efficiency). This is a bit odd; it is possible to start at the back end of the design layout (shipping) and move to the front (main entrance). This is the reason why he grants the tail of a dog move, not the other way around. But even before considering that, it is necessary to consider the impact of the layout of the installation of your room on the bench.

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