Bending stress in a beam lab report

 AM 317 MECHANICS LAB EXP 3 Stress Bending in Beam Trials Performed: September 15, 2017 Report Presented: September 22, 2017 By Rauan Alenezi Group 1 Abstract Beams are significant structural members who are used in construction projects. It is important to note that beams can be made from a variety of materials. There are beams that are made of steel, while other beams are made of reinforced concrete. The use of beams in the design depends on their strength, as they must carry both a dead load and a live load. When the beam is loaded, it experiences stress. In addition, the beam is strained by a change in the original size. Comparison of theoretical and experimental values showed that there were errors in which the highest... Show more content... The maximum load that was applied in the beam was also determined. We calculated the voltage bending in different positions of the beam to load 100N. Then the power source was connected to the voltage display and power supply and the norm in 5 minutes, from the provided for heating. Initial values were recorded and downloaded 100N, 200N, 300N, 400N and 500N done. There was zero adjustment of the strain data. The adjusted load screw was returned to load zero and power outages. The results and discussion of Table 1 below shows the specifications of the beam that was used in the experiment. Table 1: Neutral Axis Beam Position Specifications, y (mm) 11.85mm Moment of Inertia, I (mm4) 58009.9 Beam length, L (mm) 835 Modulus elasticity, E (Gpa) 73.1 Acceptable stress, No (Mpa) 70 Different graphics were developed using Excel, as shown in the figures 1.1, 1.2, 1.3 and 1.4. The first graph is shown in Figure 1 and is a calibration position against stress for experimental and theoretical values. The theoretical plot is a straight line chart, while the experimental plot is not a straight line. Figure 1.1: Experimental and theoretical stress for pH 100N Figure 1.2 shows a graph of the position of the sensor against experimental stress for various loads The purpose of this experiment is to study the effect of force of different sizes on the voltage bending in the beam Rent us for your laboratory report Writing Theory of Beam Bending When an external load or structural load applied in a beam is large enough to displace the beam its present location, what the deviation of the beam from its offended axis is called the bend of the beam. The bending emphasizes that the force that produces the bend in the beam is also applied Stress in the beam these stresses are called stress flexing. Introduction to the experiment This experiment is about studying the effect of forces of different magnitude on the bending of voltages in the beam. Structural equipment 'STR5 Bending stress in a beam' will be used to perform this experiment. Below is the shape of this T-shaped beam device used in this experiment, which was supported on the apparatus using two simple rods. In this experiment, the load is applied to two different places using a special mechanism attached to the machine. There are voltage sensors attached to the beam in different places, and these deformation sensors are used to collect data on stress products in the beam. Below is a diagram of the free body of the beam attached to the machine and under load at two different points. Voltage bending is made in the beam when the external force is applied on the beam and perform a deviation in the beam. The voltage bending mainly depends on the shape of the beam, the length of the beam and the magnitude of the force used on the beam. In order to calculate the bending of stresses in the beam the following formulas can be used E and / I / I am here E is a young module M is the moment of bending I second moment of inertia beam - this is the bend of stress (Nm-1) - this bending Strain Y is the distance from the neutral axis Procedure apparatus includes in this experiment to use an electronic system using an electronic system. Because of which it is very important to follow the steps envisaged in this experiment in the following presented order Of Setting up computer software with the manual provided by the device and put it in virtual experiment mode In the property section field, select the variable load option of the hanger from the toolbox area take the load of 100 grams and replace it by 0 grams on the section section of the Diagram of the applied force and the graph will appear as a result of the force. The software will automatically collect all the data of the experiment and keep it in memory. Repeat the third step with 200, 300, 400 and 500 grams and collect data related to each experiment The final result provided by the software and manual calculations have been mapped using charts Table 5 bend highlights the results of 1 Gauge numbers Vertical position (nominal) Vertical position (actual) Ave strains, where the moment: Ave strains, where the moment: Ave strains, where the bend: Ave bends: Where the bending moment: Ave strains where the bend is the moment: Ave strains where the bending moment: Ave strains: Ave strains, where the moment bends: Ave strains, where the bend is the moment: Ave strains, where the moment bends: mm mm 0.1 nm 17,, 7 Nm 17.5 Nm 35.1 Nm 35.1 Nm 53.0 Nm 52.7 Nm 52.4 Nm 70.2 Nm 75.0 Nm 1 0.0 ??? -28.1 -27.6 -28.0 -27.9 -27.7 -28.1 -27.9 -28.2 -27.8 2,3 8.0 ??? -54.2 -54.7 -54.2 -54.4 -54.4 -54.0 -54.5 -54.3 -54.4 -54.3 4,5 23.0 ??? -36.6 -37.0 -36.6 -36.6 -36.8 -36.2 -36.8 -36.6 -36.5 -36.6 6,7 31.7 ??? -33.1 -33.6 -33.2 -33.2 -33.4 -32.9 -33.4 -33.0 -33.2 -33.3 8,9 38.1 ??? -30.9 -31.3 -31.2 -31.0 -31.1 -30.9 -31.2 -30.9 -31.0 -31.0 Table 6 bending stresses results 2 Load Bending Moment Gauge 1 Strain Gauge 2 Strain Gauge 3 Strain Gauge 4 Strain Gauge 5 Strain Gauge 6 Strain Gauge 7 Strain Gauge 8 Strain Gauge 9 Strain Gauge 10 Strain N Nm 0.4 0.1 -27.8 -81.8 -26.7 -46.5 -26.6 -45.6 -20.7 -46.3 -15.4 -- 100.2 17.5 -27.6 -81.8 -26.6 -46.5 -26.6 -45.9 -20.5 -46.9 -15.5 -- 200.5 35.1 -27.9 -82.0 -26.8 -46.9 -26.8 -46.0 -20.8 -46.7 -15.6 -- 299.7 52.4 -27.9 -82.0 -26.7 -46.7 -26.6 -45.5 -20.5 -46.6 -15.3 -- 401.3 70.2 -28.2 -82.1 -26.7 -46.4 -26.7 -45.7 -20.7 -46.6 -15.3 -- 428.3 75.0 -27.8 -82.0 -26.6 -46.7 -26.5 -45.9 -20.8 -46.5 -15.5 -- Calculations According to the equation shown above for calculating bending stresses and strain , Есть определенные количества, как область поперечного сечения секций пучка и второй момент инерции луча должны быть известны. Ниже приведены уравнения, которые будут использоваться для решения этих количеств. ȳ Общая площадь - первая область и ее расстояние от оси X-X - вторая область и ее расстояние от оси X-X Первая область - 31,7 - 6,4 - 202,88 мм. 38,1 x 6,4 - 243,84 мм, общая площадь - 202,88 x 243,84 - 446,72 мм, 2 ȳ 446,72 - 446,72 - 22,25 - 243,84 - 3,2 ȳ (202,88 - 22.22). 25-243,84 и 3,2)/446,72 ȳ 11,85 и 〖10〗(-3) м. Beam height = 11.85 + 26.25 = 38.1 mm Second moment of area along x-x axis IXX = A*h2 + IXX base IXX = (Area) × (ȳ -y2)2 + (bd^3)/12 IXX= (6.4×38.1) × (11.85 – 3.2)2 + (6.4 × 〖31.7〗^3)/12 + (6.4× 31.7) × (11.85 – 22.25)2 + (38.1 × 〖6.4〗^3)/12 IXX = 58009mm4 Bending stresses σ = (M.y)/I Theoretical σ = (17.5 * 11.85* 〖10〗^(-3))/(58*10^(-9))=3.5* 〖10〗^6 N/m Experimental σ = (17.5 ×26.25 × 〖10〗^(-3))/(58.009 × 〖10〗^(-9)) = 7.9 * 〖10〗^6 N/m Load Bending moment Experimental bending Stress Theoretical Bending Stress N Nm Nm Nm 0.4 0.1 0.045 0.0204 100.2 17.5 7.9 3.6 200.5 35.1 15.838 7.17 299.7 52.4 23.757 10.70 401.3 70.2 31.721 14.34 428.3 75.0 33.91 15.32 Values of the bending stresses obtain from the experiment are presented in the table above and they are arranged in the respective cell according to the load that produce that bending stresses. Все данные представлены на графиках, и согласно этому графику экспериментальный изгиб стресса показывает линейную связь с нагрузкой означает, что значение экспериментальных изгиб стрессов увеличивается с увеличением стоимости прикладной нагрузки и уменьшается с уменьшением applied load. The ratio at which the value of experimental bending voltages increases and decreases is equal to the ratio at which the value of the load applied increases and decreases. According to the first graph, the link between theoretical stress bending and applied load, which looks as linear as an experimental stress curve, but in this respect the value of theoretical stress bending does not change as much as the value of an experimental stress change in relation to the change in applied load. There is a greater increase in the cost of load than an increase in the value of the theoretical stress bending The purpose of this task is to study the effect of different forces on the bending of stresses in the beam and as a result show that there is a linear relationship between stress bending and applied load. Experimental stress curves show an ideal linear relationship with applied load, while the theoretical stress bend does not respond that much to the increased applied load. Load. bending stress in a beam lab report uthm. bending stress in a beam lab report observation