

Tensile Strength

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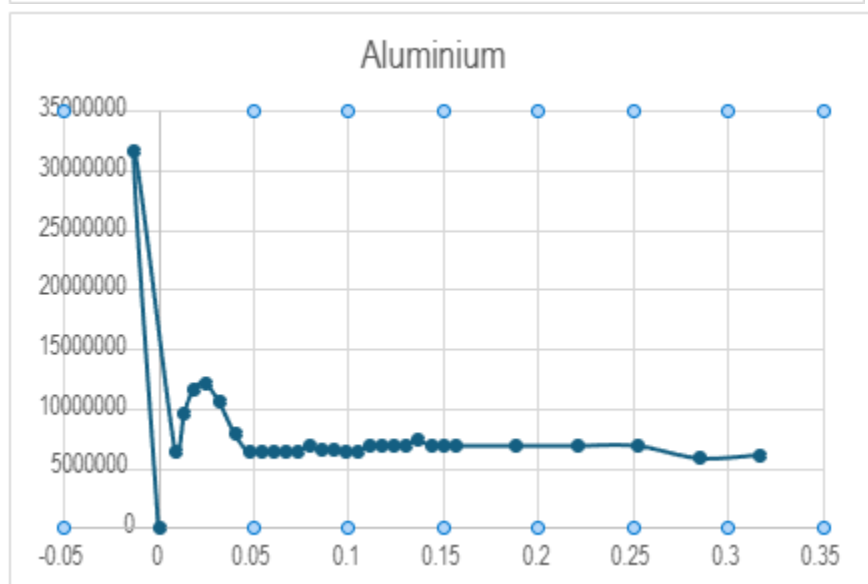
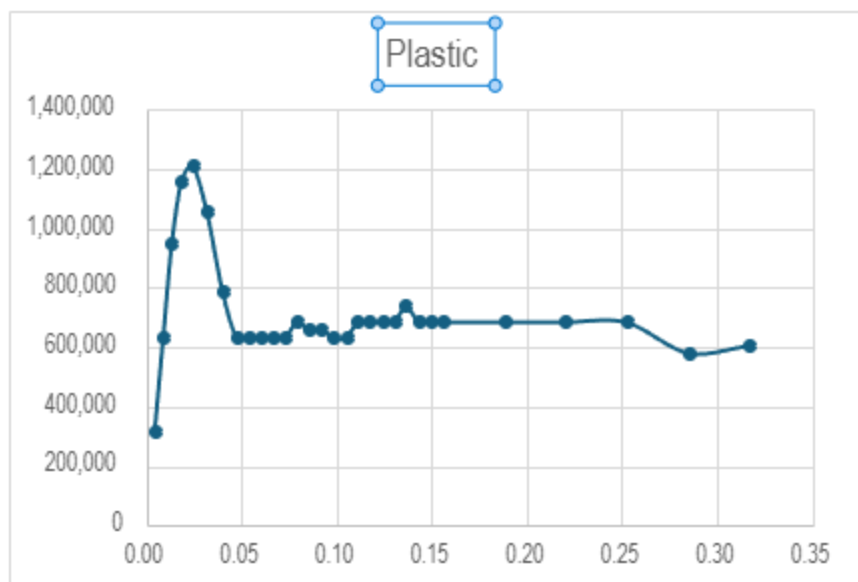
Introduction

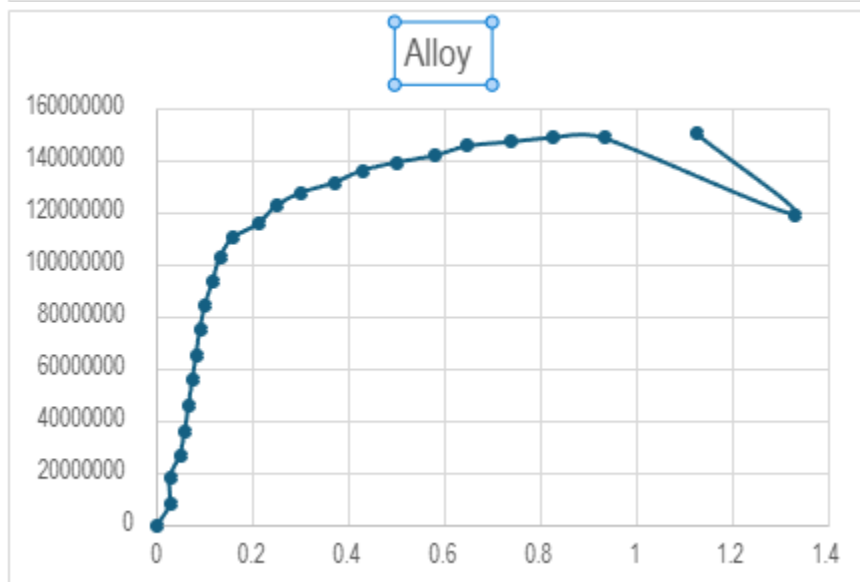
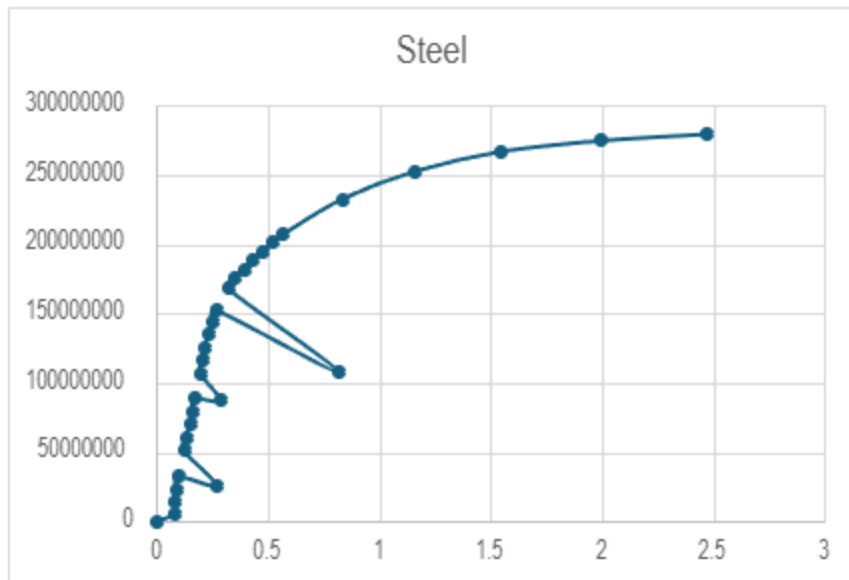
This assignment a group of students is tasks with finding out the max tensile strength of 4 different materials using a tensile strength tester found in the university science lab. The aim of this experiment is to work out when the materials hit their max tensile strength and snap. The data that was collected is then put into graphs on excel to be analyzed.

Experimental Procedure

How the investigation is undertaken is by using the tensile strength machine. How this works is this, a piece of material or in the case of this experiment in between two chucks. The material is then attached to them which when the load nut is twisted pressure is added to the material by pulling the two chucks apart from each other. After a certain amount of times the material will snap in the chucks behind the protective screen. The material once broken should be taken out of the tester and measured by another member of the team by reading the dial at the bottom of the tester. All data that is collected would then be put into the table and hence put into graphs. This should be repeated for each of the 4 materials. Its also important to remember that the dial at the bottom should be zeroed at the beginning so that the data is credible and that all data is allowed to be recorded. The screen protector should also be down at all times unless the material needs to be added or taken away to be measured. Also, to some up what it is measured, the materials length will change from the at the beginning when its put into the two chucks to when its taken out after it has snapped.

Results





Analysis

The yield strength for plastic stops after the fourth point and hence turns into elastic after this point before reaching its breaking point.

The yield strength for aluminum stops after the fifth point and then turns elastic after for a longer period of time.

The yield strength for steel is found after looking at the graphs points after looking at the points leading up to the 19th one. The yield strength then shows at the graph begins to flatten out. Also take note that 2 points on the graph are invalid results due to the not matching with the other points correlation so must not be taking into account. This could be because of a error in the process.

The final graph which is about the material alloy. This material is pretty simple to read the yield strength of this material can be seen up till 0.4 along the x axis. The rest of the data shows when it ends hence becoming elastic

When looking at the graphs above the data can be read and analyzed. Both plastic and aluminum follow the same correlation in which the materials show their tensile strength. Also to note that the other two materials alloy and steel also follow the same correlation. However, after looking at the graphs in more detail the data shows that both alloy and steel both reach there max tensile strength at a very low number compared too the other two which are aluminum and plastic.

Conclusion:

To conclude this report the assignment shows that when it comes down to over all tensile strength the best material to use steel due to the fact that it will break after a longer period of time and with more load. This can be seen when looking at the graphs above. This material had the most load applied to it. This is most seen in real life situations as steel is used in most heavy duty vehicles and building due to it having a much better load resistance and over all tensile strength hence being stated by this website below. When doing research on the max tensile strength of the four materials one clear answer became visible. Using a website from “LinkedIn” they state the following “ common structural steel can range from 400 MPa to 500 MPa”. With this in mind and the fact that steel was used and compared to the other three the winner is clear and the statement of steel having the best tensile strength can be proved true by looking at the graphs above.

Evaluation

When working with graphs and data errors will most likely due to inaccuracies in the workshop. The group when taking all the data needs to be aware that any lack of concentration would result in data being less accurate and hence making that data on the graphs seem incorrect. Its important that any potential errors to be eliminated straight

away, how this is done is by first making sure that when data is collected by a member of the group that someone else both records the data and gives a second opinion on the value shown on the dial. The team should also be communicating with each other to make sure that the dial at the top is turned correctly and that all data recorded in the booklets is all correct to ensure that the graphs show the correct data patterns and follow the guidelines in the booklet.

Further Work:

If the task was to be undertaken without a time limit and with unlimited resources the task could be undertaken in a more confident environment with results that can be collected and studied better due to no limitation on what equipment to use and as previously stated no time limit which allows the group to take time and be careful with delicate data reading skills. It must also be taken into account that due to the group now having a larger time scale and better equipment the data that will be collected can be more accurate than the data collected during this experiment due to the equipment potentially having a closer range of accuracy on the dial found at the bottom

References:

All graphs have been done by myself in the workshop provided in my university building.

[https://www.linkedin.com/pulse/aluminum-vs-steel-strength-weight-applications-compared-](https://www.linkedin.com/pulse/aluminum-vs-steel-strength-weight-applications-compared-1c#:~:text=Tensile%20Strength%3A%20Steel%20is%20the,90%20MPa%20(13%2C000%20psi).)

[1c#:~:text=Tensile%20Strength%3A%20Steel%20is%20the,90%20MPa%20\(13%2C000%20psi\).](https://www.linkedin.com/pulse/aluminum-vs-steel-strength-weight-applications-compared-1c#:~:text=Tensile%20Strength%3A%20Steel%20is%20the,90%20MPa%20(13%2C000%20psi).)

