MLZ 331 REPORT I- GUIDELINES

Dear Students,

You are required to submit a formal report covering **Exp-1, Exp-2, and Exp-3.** Detailed instructions regarding the report's structure and content are already provided **in your lab manual.** Therefore, **please carefully follow the provided instructions in the manual when preparing your report**. Below is additional guidance specifically for the Results and Discussion section, which will require a more detailed analysis of your findings.

From the Exp-1 section, it should include:

Using the graphs shared on the MATSE website on MLZ331 page,

- **Explain the particle size distribution graphs for the Al_2O_3 material.** Describe what d50 represents and explain the differences between the *unmilled* and *milled* graphs.
- **Discuss the impact of the milling process on the particle size distribution.** Did it result in a narrower or wider distribution, and how was the particle size reduced? (Hint: Consider how milling parameters such as speed or time may have influenced these changes.)

Explain how these changes in particle size distribution could affect material properties, including density, mechanical strength, and sintering behavior.

From the Exp-2 section, it should include:

- Present the **sieve analysis data** in tabular form and construct **a cumulative undersize graph**. Based on the graph, determine and report the **d10, d50, and d90** values. Provide a comprehensive discussion of the significance of these values and how they reflect the particle size distribution
- Additionally, **plot and interpret the graph showing the relationship between the applied pressure and the green density of the samples.** Discuss how varying pressure affects the green density and what this implies about the compaction behavior of the material.

From the Exp-3 section, it should include:

For the wall tiles pressed at two different pressures, analyze the **%shrinkage** and **%water absorption** values after firing. Compare your results with relevant literature, and discuss the effect of pressing pressure on the sintering behavior of the tiles.

For Al_2O_3 samples sintered using Spark Plasma Sintering (SPS), **calculate and present the bulk density, apparent porosity, and apparent solid density.** Compare your results with literature and provide a critical analysis of how these properties affect the performance of the sintered material.

Discuss the impact of sintering parameters on the overall densification and microstructure of the material.

General Notes:

- Ensure that all graphs, tables, and calculations are clearly presented and properly labeled.
- Use literature to support your discussions, particularly when comparing experimental results with established data.
- While the rest of the report structure follows the guidelines in your lab manual, make sure that your ***Results and Discussion section provides in-depth analysis*** and reflects your understanding of the experimental outcomes.