Dry Pressing - Interdisciplinary Experimental Work (Percentage of Exam: 20%)

Instructions for MLZ331 Exp. 3 Lab Formal Report

The style of the report is based on the type of "Engineering Report", a professional engineer would have to complete in a working environment. The report should be **typed by a computer** and consist of:

i. A Title Page, including experiment name, student name, student number, group name and date.

ii. An Abstract, that <u>summarizes</u> the aims and results of the experiment (5 pts)

iii. A Table of Contents

iv. An **Introduction** that briefly introduces the concept of dry pressing and its important parameters and <u>clearly states</u> the aims of the experiment. (5 pts)

v. A **Background** section that briefly discusses experimental procedure of dry pressing and discuss important parameters and defects of dry pressing.

This section must clarify:

- Green ceramic body
- Three substages of compaction
- Interrelation between granule related parameters and compaction
- Importance of flowability
- Plasticizer, binder and lubricant terms
- Why does humidity acts as plasticizer?
- (20 pts)

vi. An Experimental Procedure section that carefully summarizes the methods used, the material(s) studied and the apparatus used. Any problems related with compaction stages? (10 pts)

vii. A Results section. Give your results. (20 pts) For given humidity condition the green density vs. pressure results will be tabulated and green density/pressure graph will be plotted. For 5.5% humidity, green density/pressure, shrinkage/green density, final density (Experiment <u>6b-Archimedes</u>) /green density and porosity (Experiment <u>6b-Porosity</u>) /green density results will be tabulated and plotted. <u>Results will be shared with Ind. Eng. Students.</u>

viii. A **Discussion of Result** section. Discuss what you expected and what you obtained. Pressure effect on the green density will be discussed. Humidity effect on compaction behaviour will be compared. If the optimum pressure condition for the granules that have 5.5% humidity is 400 kg/cm², what is the optimum pressure for your sample's humidity level? Discuss it with the Ind. Eng. Students in your group (20 pts).

ix. Conclusions A brief synopsis of your results. How can an engineer overcome with compaction problems? Compare dry pressing with cold isostatic pressing. Make sure they are not too speculative. (10 pts)

x. References (American Ceramic Society Style, complete citation) (5 pts)

xi. Appendix Raw data, calculations, etc., i.e., items that may be of interest, but not always necessary (usually make reading report difficult). (10 pts)

The nature of working in groups implies that there should be cooperation and discussion between members of the group and the lab instructor. It is, however, **expected that when students prepare their reports**, that they do so individually using their own words and interpretation. <u>Plagiarizing or blatant copying of a report or reference will result in an automatic zero for the lab!!! (do not copy-paste)</u>

Reports will be on both hard and digital copy (MS Word or PDF document), digital copies will be sent to <u>www.turnitin.com</u>. Upload your files (you need to be logged in) with 36731481 class ID and experiment3 enrolment key. Students are responsible to submit their reports to the corresponding box and Turnitin class on the 06.01.2023 until 17:00. The lab instructor will grade the reports within a week and will post the results. If you wish to discuss the grade, make an appointment to see the lab instructor at his convenience. A copy of the graded reports will be handed to you upon your request if needed.

INTERDISCIPLINARY EXPERIMENTAL WORK

Aim of The Experiment:

To determine conditions necessary to produce tiles with the least dimensional scattering and to develop an algorithm to relate pressing pressures on green density at various granule humidity levels and aim to get constant green density with given granules by taking the pressing pressure as a variable.

Experiments to be done by MS&E Students:

Determine the effect pressing pressure on green density at different humidity levels, tabulate and draw graphics.

Determine the effect of green density on sintering shrinkage and the final density/porosity, tabulate and draw graphics

Share the results with Ind. Eng. Students

Tasks to be done by Ind. Eng. Students:

Develop an algorithm to relate the green density to pressing pressure at different humidity levels to get constant green density tiles by taking the humidity level as uncontrolled parameter and pressing pressure as variable.

Parameters to be measured.

Green densities are to be measured by dimension and weight of the pellets.

Humidity are to be measured by humidity measuring device or in an oven by drying at 120 °C Sintered densities & porosities are to be measured by Archimedes method.

Shrinkage values are to be measured by a good Vernier caliper.