

**Higher Technical Institute  
MECHANICAL ENGINEERING DEPARTMENT**

**DIPLOMA PROJECT**

**DESIGN OF AN ADIABATIC DRYING  
MECHANISM FOR LIQUID DROPLETS**

**BY  
MICHAEL ZAMBAS**

**M/872**

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HIGHER TECHNICAL INSTITUTE  
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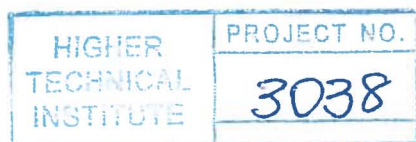
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MECHANISM FOR LIQUID DROPLETS

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Design and Construction of an Adiabatic Drying Mechanism for Liquid  
Droplets

by

*Michael Zambas*

Project Report

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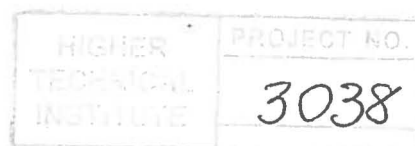
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The guidance throughout the whole procedure of building the setup was provided kindly by Dr. Nicos Angastiniotis.

Furthermore, it must be stated that in the effort to design and construct the spray dry unit, there was a strong collaboration with my fellow classmate Mr. George Tziortzis.

Even though the duties and responsibilities associated with my project were distinctly different than my classmate's, we both found ourselves numerous times working along side.

Due to the complexity of the construction we coordinated our efforts for a mutual exchange of feedback.

The above procedural steps were dictated to us by the many variables, parameters and adversity which encountered during our concerted effort.

Many individuals have provided their input in achieving the goals of the project.

For the setup some expensive equipment were needed which were impossible to be purchased. For example it was impossible to include in the projects budget a blower of 5HP. This, was provided for free by the "ΣΙΒΑ-ΛΑΡΤΙΚΟΝ" company. More specifically it was provided by the partner Mr. Giotis Konnaris who also provided us with his knowledge and experience about spray drying which is his field of operation at his factory. Mr. Giotis also provided us with an inverter for frequency control of the blower.

Besides the blower and inverter the setup includes a gear pump to supply the nozzle with 15 bars of liquid solution.

We would like to thank Mr. Marios Panagiotou of “DEKSA” who sometimes his persistence and good will exceeded ours in times we were ready to give up. Mr. Marios was present every day during the experiments and he also provided us, his knowledge, and a gear pump(s)☺ as well as a pressure manometer.

Special thanks to the industries that provided us both the chamber and the air channel. These were manufactured by “Christakis Agathaggelou Ltd” and “Arhimedes Factory” respectively. We were impelled to construct the above due to the fact that there were inadequate materials and equipment in the H.T.I for the purposes of our project.

Finally we would like to thank the instructors from the electrical department, MR. Costas Georgiades, Mr. Panicos Hatzimichael, and the lecturer Mr. John Demetriou, whom without their personal assistance and care we would not have been able to operate the whole setup.

We thank once more everyone for their assistance for the completion of our project.

## **Abstract:**

Intimate mixing of metallic constituents is enabled by dissolving soluble salts of metallic species in liquid medium. Subsequent atomization and explosive drying of the droplets result in close coordination of the metallic elements. The process yields AN intimate mixing of the metallic constituents with virtually no limitation with regards to the choice of the metallic constituents.

The method outlined in this project deals with the specifics of the design of the spray dryer the limitations and optimization parameters. Actual construction parameters are also presented with cost analysis in relation to effectiveness and minimal cost.

It has to be emphasized that the method enables the making of engineering composites, which are otherwise impossible to be obtained due to the immiscibility of the liquid phases of the constituent metallic species