

E-Waste Management
(Design and Modeling of Plasma Pyrolysis Reactor)

DISSERTATION

(Submitted in the partial fulfillment of the requirement of the degree)

Of

MASTER OF TECHNOLOGY

In

PRODUCTION ENGINEERING

By

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CANDIDATE'S DECLARATION

I, **Pravesh Kumar**, hereby declare that the work carried out in this project report entitled, “**E-Waste Management (Design and Modeling of Plasma Pyrolysis Reactor)**” is present on behalf of partial fulfillment of the requirement for the award of degree of “**MASTER OF TECHNOLOGY**” in Production Engineering submitted to Delhi Technological University, under the supervision of **Dr. Qasim Murtaza**, Associate Professor and **Mr. Saurabh Agarwal**, Assistant Professor in Mechanical Production & Automobile Engineering Department.

I have not submitted the record embodies in this report for the award of any other degree or diploma.

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CERTIFICATE

This is to certify that the report entitled “**E-Waste Management (Design and Modeling of Plasma Pyrolysis Reactor)**” submitted by **Pravesh Kumar (Roll No. - 2K11/PIE/22)** in partial fulfillment for the award of Masters of Technology in Production Engineering from Delhi Technological University, is a record of bonafide project work carried out by him under our supervision and guidance.

To the best of our knowledge the result contained in this thesis have not been submitted in part or full to any other university for the award of any other degree or diploma.

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ABSTRACT

E-waste is the fastest growing part of the solid waste stream. As the world population becomes greater consumer of electronic gadgets, they left a lot of discarded electronic waste after their useful life. The E-waste has valuable as well as toxic materials like Arsenic, Cadmium, Copper, Mercury, Cobalt and Lead. These toxic materials are responsible for various serious diseases, like lung cancer, itai-itai, genetic disorder, kidney failure, headache and so on. Nervous system and reproduction system of human being affected badly by contamination of heavy metals. To secure human health and environment E-waste needs proper disposal and can recycle for the reuse of valuable metals. But a lot of informal recycling units running in the country in which people work without any safety. The informal recycling leads to serious human health and environmental hazards. To reduce these hazards (water, soil and air pollution) generated by contamination of heavy metals, formal recycling is the solution. The goal of the present research work is to enhance efficiency of metal recovery from waste of electrical & electronic equipment (WEEE). The project presents the construction aspects of plasma technology for recycling of waste printed circuit boards of metal recovery, with design data for plasma reactor. In the report, a thorough study of present development in the field of E-Waste management has carried out. The plasma pyrolysis reactor leads formal recycling process and enhances the metal recovery efficiency up to 14%. The indigenous new plasma pyrolysis reactor designed and developed especially for small-scale industries.

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LIST OF SYMBOLS

S. No.	Symbol	Unit
1	Thermal conductivity (k)	W/mK
2	Length (l)	m
3	Temperature (t)	°C
4	Radius (r)	m
5	Mass (m)	kg
6	Specific heat (Cp)	KJ/kg k
7	Mole (M)	m/Mo.Wt.
8	Efficiency (η)	%
9	Velocity (v)	m/s
10	Heat transfer (h)	w/m ² k
11	Heat transfer (Q)	KW
12	Density of air (ρ)	kg/m ³
13	Dynamic viscosity (μ)	N-s/m ²
14	Kinematic viscosity (u)	m ² /s
15	Diameter of pipe (d)	m

- Metals have their usual symbols.

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