KINGS COLLEGE OF ENGINEERING
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B++ NAAC

DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2023-24 (ODD)

INTERNAL STAFF SEMINAR REPORT

Date& time : 25.10.2023 & 12.30 P.M.

Venue : Department Smart Classroom

Topic : Seminar on "Plasma Arc Sintering and Process Parameters"

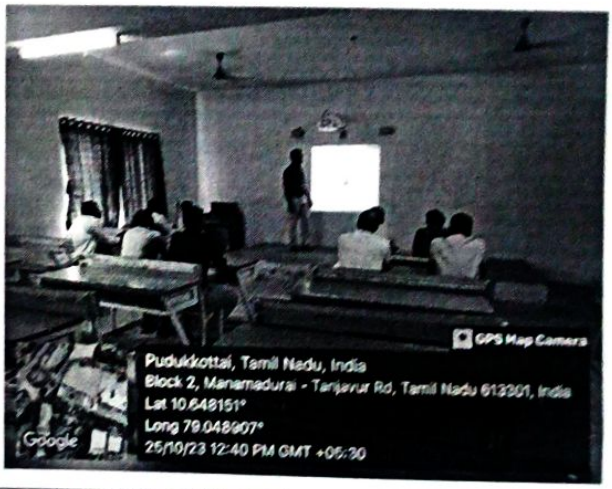
Resource person : Dr.M.Melwin Jagadeesh Sridhar
Assistant Professor,
Mechanical Engineering,
Kings College of Engineering-Punalkulam.

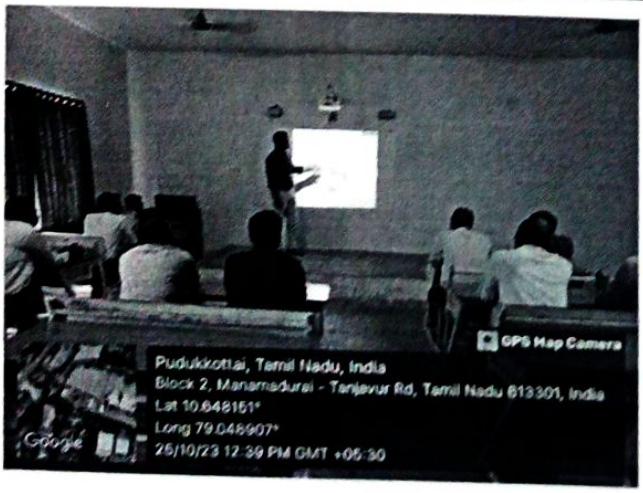
On behalf of the Department of Mechanical Engineering organized an Internal Seminar on "Plasma Arc Sintering and Process Parameters" for faculty members of the Mechanical Department on 25.10.2023 at smart class room. The main objective of the internal seminar is to provide exposure to our faculty members on various research areas in plasma arc sintering.

The Following Points were Discussed During the Session:

- The optimal SPS sintering parameters were a sintering temperature of 500 °C, a pressing pressure of 30 MPa, a sintering time of 12 min and a heating rate of 160 °C/min, which translated into a density of 2.71 g/cm^3 and a microhardness of 38.61 HV [57,58,59,60,61].
- Spark Plasma Sintering (SPS) is a sintering technique used to fabricate dense and homogeneous bulk materials from powders. It involves the application of pulsed direct current (DC) and uniaxial pressure to the powder within a die.
- The process variables are involved in sintering are mostly thermodynamic variables, such as temperature, time, atmosphere, pressure, heating and cooling rate. Many previous sintering studies have examined the effects of sintering temperature and time on sinterability of powder compacts.
- There are three different heating techniques for pressureless sintering - constant-rate of heating (CRH), rate-controlled sintering (RCS), and two-step sintering (TSS). The ceramic microstructure and grain size will vary depending on the material and technique used.

- Solid-State Sintering: Powdered material is heated to a temperature just below the melting point. This bonds the particles together by atomic diffusion at the grain boundaries. Liquid Phase Sintering: Uses the addition of a small amount of a solvent liquid to the powder to induce low porosity and bonding.
- Spark plasma sintering, also known as plasma pressure compaction (P2C) sintering, equipment are commercially available now and are no longer limited to laboratory research work.
- Common process variables are flow, level, pressure, temperature, turbidity, chlorine, and oxygen levels.





Snapshots of the Session

Chapters Discussed:

- Copper and copper alloys are used to produce sintered metals.
- Sintered steel is produced using steel and steel alloys.
- Powder iron can be used to produce sintered iron.

- Powders used in metal sintering includes: Iron and Carbon Steels. Iron-Copper and Copper Steels. Iron-Nickel and Nickel Steels.
- FAST Sintering (or Field Assisted Sintering Technology), is a process that allows the production of more resistant and high-density materials from powders.

Outcomes:

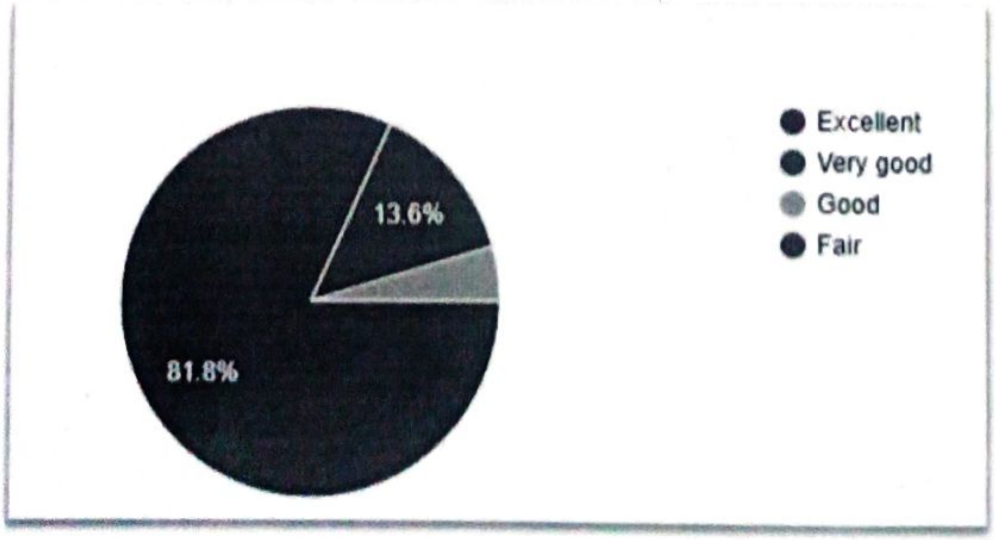
Upon listing of this seminar the participants can able to

- Understand sintering provides mechanical strength, eliminates pores, and increases the ceramic density.
- Understand the concepts and functioning of sintering.
- Able to understand the sintering temperature in recent advancements.

References:

1. Tiwari D., Basu B. and Biswas K. 2009 Ceram. Inter. 35 699.
2. Grasso S., Sakka Y. and Maizza G. 2009 Sci. Technol. Adv. Mater. 10 053001.
3. Olevsky E. a. 1998 Mater. Sci. Eng. R Reports 23 41-100.
4. Hu C., Sakka Y., Tanaka H., Nishimura T. and Guo S. 2010 J. Euro. Ceram. Soc. 30 2625.
5. Kraft T. and Riedel H. 2004 J. Eur. Ceram. Soc. 24 345-361.

Feedback Analysis:



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Staff Incharge

T. Ponmony 25/10/23

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