National Institute of Technology Rourkela

Defence Seminar

Seminar Title	: Selection of Efficient Drying Technique for Briquettes of Iron Ore Fines and Metallurgical Wastes
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Venue	: Seminar Room, Department of Mining Engineering
Date and Time	: 30 Jun 2025 (4:00 PM)
Abstract	: In most of the iron ore mines, mineral deposits are found in the form of narrow veins, sheets and lenses with lots of impurities around them. The utilization of iron ore fines began as they were generated in large amounts as compared to lump iron ore. The briquettes of iron ore fines were developed using metallurgical wastes and different binders such as bentonite and cement. The strength of various compositions was evaluated to identify the one with the highest strength after open-air drying. Hot air drying was then tested to determine its effectiveness in enhancing the strength of the iron ore briquettes compared to open-air drying. The results showed that the briquettes exhibited improved strength after being dried in a hot air oven. Different drying techniques were employed like hot air, microwave and infrared drying on the iron ore briquette. The briquettes were then stored in open air, and several experiments were conducted to identify the most efficient drying method. Infrared drying at 120°C achieved the highest compressive strength of 4.195 N/mm^2 (MPa), significantly surpassing the values obtained with microwave drying (2.884 MPa) and hot air drying (3.680 MPa). Hot air drying, with an energy consumption of 0.3 kW/h, produced briquettes with higher strength compared to those dried using the microwave. Although microwave drying is the most cost effective method, consuming only 0.2 kW/h it resulted in the lowest compressive strength compared to both hot air and infrared drying. Infrared drying, which had the highest energy consumption at 2.3 kW/h, achieved the maximum strength at 120°C compared to the other drying methods. The infrared drying method will also be cost effective when applied on a large industrial scale.