Establishing a Permanent Diesel Filling point at Nuagaon Iron Ore Mines, JSW Steel.

- Sourav Mitra[1], Vishwajeet Baral[2], Ashutosh Patel[3], Arundeep Bhattacharya[4].

Introduction

The Nuagaon Iron Ore Mines, operated by JSW Steel with a vast lease area of 776.969 hectares, began its mining operations in 2020 under a Mining Development Operator (MDO). As operations expanded and the need for increased mechanization grew, JSW Steel made a strategic decision to shift towards departmental mining to enhance productivity and establish a benchmark in the mining industry. This transition began with the procurement of advanced heavy equipment, including 4 excavators in the 125-ton class, 12 dumpers with a 100-ton capacity, 1 wheel loader, and other ancillary Heavy Earth Moving Machinery (HEMMs).

This significant move towards departmental mining aligns with JSW Steel's commitment to improving operational efficiency and safety within the mine. As part of this commitment, the establishment of a permanent diesel filling stand at the Nuagaon iron ore mines represents a pivotal shift in how wheel-mounted equipment such as dumpers and other HEMMs are refueled within the mine. The new setup serves as a centralized point for diesel refueling, eliminating the need for fuel bowsers to navigate the hazardous terrain of mine pits, thereby enhancing safety and operational effectiveness.

Centralized Refueling for Enhanced Safety

One of the primary advantages of this permanent diesel filling stand is the elimination of fuel bowser movements within the mine pits. Previously, mobile diesel bowsers were used to refuel equipment across various locations, a practice that posed significant risks. The movement of these large fuel trucks within the uneven and often unpredictable mine terrain increases the likelihood of accidents, including spillage, vehicle rollovers, and collisions with other equipment.

By centralizing the refueling process at a single, fixed location, the new diesel filling stand substantially reduces these risks. All wheel-mounted equipment now converges at

this designated point for refueling, ensuring that diesel filling occurs in a controlled environment. This not only minimizes the potential for accidents but also ensures compliance with stringent safety protocols.

Fig 1:- Centralized Diesel Filling Point.

Challenges of Previous Refueling Practices

Before the establishment of the permanent diesel filling stand, refueling wheel equipment's within the Mines pits presented significant safety challenges. The mobile diesel bowsers had to travel into the mine pits, navigating through hazardous and uneven terrain. This movement not only created congestion within the pits but also heightened the risk of accidents, including potential vehicle rollovers and collisions with other equipment.

Additionally, the refueling process itself involved helpers climbing up ladders to reach the filling points on the dumpers, exposing them to the dangers of slips, trips, and falls.

These unsafe practices made the refueling procedure not only hazardous but also inefficient, further complicating operations within the mine.

Fixed Stand: A Sustainable and Efficient Solution

The fixed diesel filling stand is designed with sustainability and efficiency in mind. It is strategically located within the mine to ensure easy access for all equipment without causing significant downtime. The stand ensures quick and efficient diesel transfer to the machinery.

The permanent nature of the stand also allows for better management of diesel resources. Unlike mobile bowsers that are prone to spillage, the fixed bowser stand has a robust system, reducing the risk of environmental contamination. Additionally, it is easier to monitor and maintain, ensuring that the equipment is always in optimal condition for safe and efficient operation.

Fig 2: Diesel Filling in Dumper at fixed fueling point.

Streamlined Diesel Filling Procedure

The introduction of the permanent diesel filling stand has led to a more streamlined and standardized diesel filling procedure. Operators are now required to adhere to a specific protocol when refueling their equipment to ensure safety and efficiency:

1. Parking: Upon arriving at the diesel filling stand, the operator must first park the machine in the designated area.

2. Battery Cut-Off: Before refueling can commence, the machine's battery must be cut off. This crucial step prevents any accidental start-up or movement of the equipment, which could otherwise lead to dangerous run-off incidents.

Fig 3: - Battery Cut-off by operator.

3. Refueling: Once the machine is securely parked and powered down, the refueling process begins.

Fig 4: Diesel Refuelling in Dumper.

4. Post-Refueling Check: After refueling, the operator ensures the completion of the process by signing the diesel logbook and performing a walk-around inspection of the equipment.

5. Return to Operation: The operator then switches on the battery cut-off and proceeds with the operation.

This standardized procedure ensures that each step is followed meticulously, reducing the chance of human error and significantly increasing the overall safety of the operation.

Cost-Benefit Analysis:

- **Average Diesel Consumption per Hour:** 5 liters/hour
- **Average Running Hours per Day (Before Setup):** 8 hours
- **Average Running Hours per Day (After Setup):** 3 hours
- **Reduction in Running Hours per Day:** 5 hours

Diesel Consumption and Cost Savings:

Diesel Savings per Day:

1. **Before Setup:** 8 hours/day * 5 liters/hour = 40 liters/day
2. **After Setup:** 3 hours/day * 5 liters/hour = 15 liters/day
3. **Daily Diesel Savings:** 40 liters - 15 liters = 25 liters/day

Cost Savings:

1. If the cost savings are approximately Rs 4000 per day, this likely includes savings on both diesel and maintenance.
2. **Daily Savings Estimate:** Rs 4000

- **Cost Savings per Day:** Rs 4000
- **Annual Savings:** Assuming 365 operational days, the annual savings would be approximately Rs 4000 * 365 = Rs 14,60,000.

This analysis shows significant cost savings primarily due to reduced diesel consumption and maintenance, making the setup of the permanent diesel filling stand a financially beneficial decision.

Conclusion

The establishment of a permanent diesel filling stand at Nuagaon iron ore mines is a significant advancement in JSW Steel's commitment to safety and operational efficiency. By centralizing the refueling process and eliminating the need for mobile bowsers within mine pits, the new setup not only enhances safety but also optimizes the overall efficiency of mine operations. The fixed bowser stands, with its advanced technology and streamlined procedures, ensures that diesel refueling is conducted in the safest and most

effective manner possible, aligning with JSW Steel's goals of sustainable and responsible mining practices.

Acknowledgement

We thank our Mines Agent / Operation Head of JSW Odisha Mines, Shri Ram Shanker Sharma for his guidance, constant support and giving free hand in preparing this article in the most elaborate manner.

Disclaimer

The article is an amalgamation of data collected from own views and thoughts and actions. JSW Steel Limited does not necessarily subscribe to the views and thoughts expressed in the article and should not be held responsible for the same.