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The design, development and operation of a shaft system is a critically important element in mining, and needs specialised technical input.Experience has shown that the consequences of damage to shaft systems caused by geotechnical factors are serious and costly.Control of ground conditions is a key factor in the design and sinking of shafts, as these conditions may vary considerably throughout the length of a shaft and require specific technologies to ensure safety and functionality.Close to the surface, weathered rock and residual soils are common; these materials generally are too weak to carry the high foundation loads exerted by large headgear structures, winder houses and other surface infrastructure. SRK has designed concrete piles to carry surface loads exerted by the shaft headgear. In swelling soils, an innovative double pile system has been used to carry loads and also to prevent soil pressure from damaging the infrastructure.Ground water often affects upper areas of the shaft and must be controlled by grouting to prevent water from entering the shaft, or by drainage systems built into the lining structure.Natural breaks in the rock, such as joints and faults, affect the behaviour of the rock mass at shallow and intermediate depths (down to 1,000m below surface). Dolerite sills encountered near surface pose their own problems; they tend to break up into small blocks. Often, around 1000m below surface, the stresses that exist naturally in the ground become large enough to begin to induce additional fractures in the rock mass.Simple support systems – like rock bolts or split sets, wire mesh and shotcrete – are adequate to protect the workforce involved in sinking the shaft under these conditions. A monolithic concrete lining, usually 300-500mm thick, gives permanent support and carries the fastening systems for buntons, pipework and electrical cable bundles. It also seals the rock and prevents weathering and deterioration over the planned operating life.Certain weak geotechnical zones exhibit time dependant behaviour and can deform excessively (squeezing) when the shaft experiences stress changes during its life. This squeezing can cause severe failure of the lining. SRK has designed and implemented a support system which can accommodate large deformations in the shaft barrel and maintain serviceability of the shaft.SRK has developed a systematic design process during the sinking of several shafts, which incorporates experience gained from rehabilitating existing shafts. The design process comprises gathering data from borehole cores and mapping of exposed rock; analysing this data to assess the rock mass response to excavations; assessing the possible modes of failure; analysing excavation and support designs, through to monitoring the implementation of the design. 0 ratings0% found this document useful (0 votes)520 viewsThe document is a grade 8 assessment task for a mechanical systems and control practical assessment on mine shaft head gear. It consists of an investigation section where students answer que…AI-enhanced title and descriptionSaveSave Grade 8 Tech Term 3 PAT . 2020 For Later0%0% found this document useful, undefined Responder: A palavra "antecede" antecede o termo "pai". A palavra que antecede o termo "pai" é "antecede". Answer: A design brief for a mining headgear provides a structured outline of the requirements, specifications, and constraints that must be considered during the design and development process. This document aims to ensure that the final product meets the intended purpose, safety standards, and operational efficiency. Here’s a comprehensive design brief for a mining headgear: Design Brief for Mining Headgear Objective: To design a robust, safe, and efficient mining headgear system that supports the vertical transportation of materials and personnel in an underground mining operation. The headgear must comply with industry safety standards, minimize operational costs, and ensure longevity and reliability. Specifications: Structural Integrity: Material: High-strength steel or equivalent materials to withstand extreme loads and harsh environmental conditions. Load Capacity: Support maximum static and dynamic loads, including the weight of lifting equipment, personnel, ore, and other materials. Height: The headgear must be tall enough to accommodate the hoisting system requirements and provide adequate clearance for operations. Hoisting System: Type: Electric or hydraulic hoisting mechanism to facilitate efficient lifting and lowering of loads. Speed: Variable speed hoists to accommodate different load weights and operational needs. Capacity: Adequate to handle both personnel and material loads, with redundancy in safety features. Safety Features: Emergency Brakes: Automatic brake systems to prevent free fall in case of mechanical failure. Overload Protection: Devices to monitor and prevent overloading beyond the design capacity. Fire Resistance: Fire-retardant materials and coatings to reduce fire hazards. Escape Routes: Safe and accessible escape routes for emergency evacuation. Environmental Considerations: Corrosion Resistance: Use of corrosion-resistant materials and coatings to enhance durability in wet and chemically harsh conditions. Dust Control: Integration of dust suppression systems to maintain visibility and air quality. Noise Reduction: Acoustic insulation to minimize noise pollution. Operational Efficiency: Maintenance Access: Design features that allow easy access for inspection, maintenance, and repairs. Automation: Integration with automated control systems for remote operation and monitoring. Energy Efficiency: Use energy-efficient motors and materials to lower operational costs. Constraints: Budget: Cost Limitations: The project must stay within the allocated budget without compromising on safety and quality. Regulatory Compliance: Industry Standards: Adherence to local and international mining safety standards and regulations. Environmental Laws: Compliance with environmental protection laws and sustainable practices. Timeframe: Deadline: Completion of the design and construction within a specified timeframe to start operations as planned. Site Conditions: Geological: Design considerations for the specific geological conditions of the mining site. Space: Limited spatial constraints of the existing site infrastructure that must be accommodated. Technical: Compatibility: Ensure the new headgear is compatible with existing mining operations and equipment. Reliability: High reliability with minimal downtime to avoid disruptions in mining operations. Final Considerations: The designed headgear must be robust to withstand the rigorous demands of a mining environment while ensuring the safety of personnel and operational efficiency. It should also be cost-effective, environmentally friendly, and meet all relevant regulatory requirements. Design and construct a mine shaft headgear system for Platinum Stars, prioritizing safety, efficiency, and environmental responsibility. Step 2: Identify Project Requirements Design an efficient, safe, and environmentally responsible headgear system capable of handling Platinum Stars' operational loads and depths. Step 3: Tender Requirements Prepare detailed design specifications including sketches, load calculations, safety features, and an environmental impact assessment. Ensure compliance with all relevant mining regulations. Step 4: Worker Support Requirements The mine winch system must safely transport workers, minimizing noise and vibration. Step 5: Headgear Operational Requirements The headgear must efficiently lift and lower mining cages and skips at approximately 5 m/s, supporting at least 20 tons. Step 6: Safety Requirements Incorporate emergency brakes and install safety fences and signage to prevent unauthorized access and alert workers to hazards. Step 7: Environmental Requirements Utilize environmentally friendly and sustainable materials. Implement noise and dust reduction measures to minimize impact on local flora and fauna. Final Answer A mine shaft headgear system design prioritizing safety, efficiency (5 m/s speed, 20-ton capacity), and environmental responsibility, meeting all regulatory requirements and minimizing impact on workers and the surrounding environment. See Full Answer