

MRM: Technical advancement to the Quarry Industry

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TECHNICAL ADVANCEMENTS TO THE QUARRY INDUSTRY, A HIGHLIGHT



POTENTIAL LIES WITHIN

ELEMENT OF TECHNOLOGICAL ADVANCEMENTS:

- **Automation and Robotics**
 - Autonomous Equipment,
 - Drones provide fast and cost-effective images, stockpile volumetrics, and safety hazards in real-time,
- **3D Modeling and Geospatial Technology**
 - 3D Laser Scanning and lidar scanning enable highly accurate mapping,
 - GIS (Geographic Information Systems) software can track material flow and optimize site layout, added environmental application,
- **Advanced Crushing and Screening Technology**
 - Technological advancement in crushers, cone and impact crushers,
 - Mobile Crushing and Screening plants allowing for onsite crushing and screening,
- **Energy-Efficient Equipment**
 - Electric and Hybrid Vehicles reduce fuel and maintenance,
 - Energy Monitoring Systems deployment to reduce energy consumption, solar solutions,



ELEMENT OF TECHNOLOGICAL ADVANCEMENTS:



POTENTIAL LIES WITHIN

- **Data Analytics and IoT Integration**

- Predictive Maintenance tools, sensors on equipment, AI programming and monitoring of equipment and conditions,
- Operational efficiency monitoring with data collection, simulation,
- Captured data of importance would include, production rates, fuel consumption, and equipment performance,

- **Water Management and Dust Suppression**

- Closed-Loop Water Systems aiming to recycle and reuse water,
- Dust Suppression Technology by deploying automated dust suppression,

- **Environmental Monitoring and Compliance**

- Environmental Sensors monitoring air quality, noise levels, and vibrations helping quarry operations meet environmental regulations **and STAKE holder engagements**,
- Biodiversity monitoring through remote sensing and environmental data collection ensuring compliance with sustainability standards,

- **Virtual and Augmented Reality**

- Training and Safety Simulations by implementing VR and AR to provide immersive training for workers, allowing them to practice on machinery in a safe environment,
- AR for Equipment and Plant Maintenance, guiding maintenance technicians through complex procedures, reducing errors and downtime,



WHERE DO YOU START



POTENTIAL LIES WITHIN

- **What is the barrier to entry for a Quarry In South Africa**

- High Opex and Capex cost, Commodity Value, ROI, NPV expectations,
- Labour force expectations, realistic?
- Decline in market, capital expenditure, volume reduction, and distance to market,
- Community and environmental pressure groups that does have resistance towards mining,
- Community expectations from the operations,
- High cost of Mining Permit, Mining Right applications, and on top of that slow regulatory decision making,
- Loss of skill and competition for skill, are we transferring knowledge fast enough?
- The biggest stumble block though for technological advancements is
 - high input cost of technological systems,
 - low rate of acceptance and
 - slow response in incorporation of technology,
 - literacy



ADVANCEMENTS AND APPLICATION



POTENTIAL LIES WITHIN

- **Survey:**
 - Daily monitoring of stockpiles, stock control,
 - Volumetric management, daily and monthly reconciliation, cost control measures,
 - You cannot manage if you cannot measure,
- **Land management:**
 - Do you have license management software in place to manage the complexities of license management in RSA,
 - Your hard and very expensive asset will need be protected,
- **Drilling, logging and RMR**
 - Do you record the hardness of your exploration and production blocks from your drilling data?
 - Do you perform RQD logging and RMR ratings?
 - Why? What is the purpose?
 - Optimization of the blasting pattern and powder factors increasing fragmentation. Schedule and planning,
 - Do you analyze your fragmentation?
 - Do you update your geological and mining model based on the information recorded?



ADVANCEMENTS AND APPLICATION (CONTINUE)



POTENTIAL LIES WITHIN

- **Incorporation of data**

- Do you have a resource, and a reserve statement and is this on your web site, balance sheet?
- How well is your ore body characterised?
- Is the ore body characteristics transferred and modeled as part of your geological model?
- Is your Mining Model updated accordingly?
- Do you plan accordingly, adapt scheduling, mine and produce different products, losses?

- **Value of data, where does Ai fit**

- Large data sets allow modeling, basis for Ai and construction of numerical modeling,
 - Isolated data sets are being generated, is this in context, have you performed a business assessment,
 - Data sets also allow not only Ai but identify valuable six sigma business improvement projects, i.e. tires and road surfaces,
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- **Work wise with your resource, especially close to your market, resistance will hinder you in future expansions,**



ADVANCEMENTS AND APPLICATION (CONTINUE)



POTENTIAL LIES WITHIN

- **Ai versus Cs**

- Ai will be impossible without the measuring, recording and reporting of data,
- Is your operation set up to record information supporting your strategic intent, supporting your share holder value,
- Do you know what is required from you to develop a reporting framework, what are your key business drivers,
- **Can you afford Ai if you do not have the basic principles in place,**
- **Is there place for AI in your operation**



CLOSING REMARKS

Technological advancements are required to counter the barrier to entry, support operations, increase productivity and ultimately increase the NPV,

But start with the basic parameters underpinning the operation, define your value chain,

Capture relevant data, then model,

Implement technology available from your service providers, isolated but powerful,

But over and above all, Let CS remain,

POTENTIAL LIES WITHIN



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