

Comments on Rock Blasting

Explosive Selection in Rock Blasting (1 of 4)

By Bruno Pimentel.



Hello, my friends. I hope you are all well, and that our articles are somehow contributing to making your detonations more efficient and safe. As always, we provide the links below for you to check our previous articles and to register to receive automatic notifications for each new article we publish monthly:

Português

<https://www.linkedin.com/newsletters/desmonte-de-rocha-c-explosivo-6941709482355748864/>

English

<https://www.linkedin.com/newsletters/rock-blasting-6959820770344595456/>

Let's use the next three articles to talk about a topic that, despite appearing obvious, requires analyzing many variables that are beyond our control or are extremely limiting, preventing us from making the best choices to achieve our goals. We're talking about the selection of explosives and accessories we will use in our detonations. Although it may seem like a straightforward matter, we can say that the choice is not that easy. Despite involving various technical considerations in the selection, there are many other factors that influence this decision, making this choice a symphony that needs to harmonize safety and efficiency factors, as well as the various existing limitations.

It's essential to understand that the stage of selecting explosives and accessories is an initial process at the beginning of rock blasting. Still, we often have the opportunity to make optimizations throughout the process in which we need to reevaluate our considerations and often make new choices.

Here, the fundamental principle is clear: detonation must be efficient, safe, and provide satisfactory results, all while considering cost optimization. In addition to this fundamental guideline, a comprehensive understanding of technical and practical aspects is vital. Our choice not only impacts the moment of detonation but resonates throughout the entire operation.

It's important to remember that the use of explosives is heavily regulated in virtually every country. Laws and regulations outline the path to safety, emphasizing the need to prioritize the integrity of everyone involved and affected by the process. An indisputable starting point is that the choice of

explosives and accessories must be intrinsically linked to ensuring safety and compliance with the regulations of each location.

Another crucial point to internalize is that, although a web of theoretical factors is relevant in the selection of explosives and accessories, operational reality imposes its limitations, and often they are much more intense than technical considerations. In a practical analysis, three main factors stand out as guides for this choice: commercial issues, restrictions imposed by supply contracts or availability, and operational specificities. Identifying the explosives supplier, understanding the products available under contract, and aligning the choice with operational procedures are considerations that merge in this process.

It's important to highlight that, despite the inherent restrictions in practice, our mission is to unravel the essential criteria that shape the selection of explosives and what we usually need to take into account in our daily operational lives. Our commitment remains to understand the technical, operational, and regulatory principles that influence the choice. Through this understanding, we will be empowered to make informed decisions, applying our accumulated knowledge to shape a choice that, within the circumstances, optimizes the desired results.

Guiding Principles in the Selection of Explosives and Accessories

With the initial understanding of the importance of the careful selection of explosives and accessories, it is essential to outline the six general principles that constitute the pillars of this strategic selection. Each of these principles is a critical piece in the decision-making puzzle, shaping our options and guiding our steps toward a successful and efficient detonation.

1. Supplier Availability and Support: A crucial point influencing our choice is the range of options offered by local suppliers. Some operations may enjoy a wide range of choices, while others in more remote locations may encounter supply and support limitations. Analyzing this availability is the starting point, avoiding consideration of products that are not accessible.

2. Safety in Application and Detonation: Safety is the backbone of any operation, and the choice of explosives is no exception. Evaluating the level of control and quality of operational practices is essential to determine which explosives best align with safety standards. Operations with high standards have broader flexibility, while those with lower safety levels should prioritize safer products.

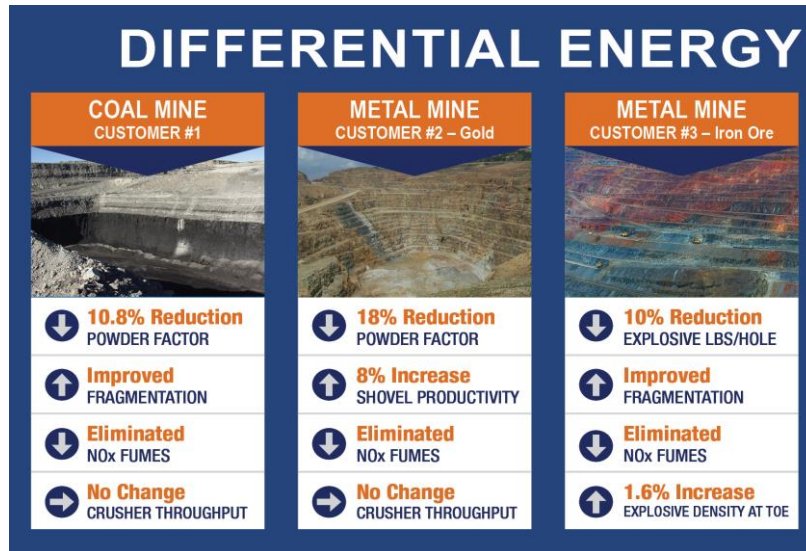
3. Technical Requirements: Each operation has specific technical needs derived from particular control requirements, desired outcomes, and predefined limits. These needs guide the selection options, forming a bridge between operational goals and the ideal explosives to achieve them.

4. Operational Considerations: The scale and operational characteristics are determinants in product selection. Smaller operations may opt for explosives with manual application, while larger ones, due to production demand, may be limited to pumpable products. Operational efficiency and practicality are key factors here.

5. Expected Results: The specific goals and objectives of each detonation shape the choice of explosives. Fragmentation parameters, dispersion, effects, and other performance criteria direct the selection, ensuring that the desired results are consistently achieved.

6. Costs: While we aim for the best performance, financial balance is undeniably relevant. Cost plays a crucial role, varying in its influence from one operation to another. Sometimes costs will be decisive, while in other situations, the overall value of benefits will carry more weight.

A thorough understanding of these principles provides the necessary foundation for an informed and effective choice of explosives and accessories. Each of these factors interacts uniquely, converging to shape a solution that is optimized for the specific operation at hand.



The Complexity of Choice: Crucial Aspects and Information

Choosing the right explosives and accessories for an ideal detonation requires a careful analysis of all the information involved. We start by looking at the characteristics of the rock that will be broken and consider how the products will be used. The more detailed information we have, the better choices we can make.

In addition to understanding the needs of each detonation, it's essential to have a deep knowledge of the available explosives and accessories. Our primary sources of information are manufacturers and suppliers, but it's important to note that they use different descriptions for their products. Therefore, when comparing products from different sources, we need to evaluate the available information carefully.

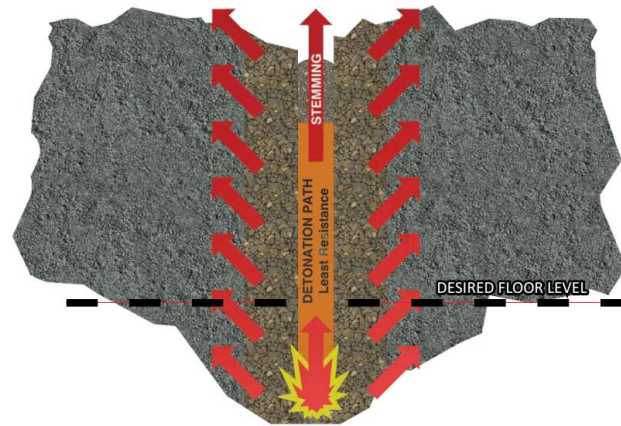
It's also crucial to consider how the chosen products fit into the operational techniques used. There should be a harmony between the characteristics of explosives and accessories and the practical approach. For example, selecting high-energy explosives and using them with inadequate operational practices contradicts the purpose of the selection, resulting in poor outcomes and resource waste. Hence, the combination of product and practice should be carefully planned.

Smart choices of explosives and accessories go beyond technical analysis. It's a blend of comprehensive information, from geological characteristics to operational techniques, with manufacturers providing crucial information. Understanding how all these elements interconnect is essential to optimize detonations, achieve excellent results, and ensure a safe and productive working environment. In the following segments, we will explore in detail the specific criteria and procedures that guide the selection of explosives, turning the complexity of the process into a continuous learning opportunity.

Unraveling the Process: Detailed Selection of Explosives and Accessories

To make the process of selecting explosives and accessories more understandable, we will divide it into three important stages. This will allow us to focus on each stage in more detail. The three stages are:

1. **Main Explosive Selection:** The first step is to select the main explosive, the one that will do the primary job of breaking the rock. This forms the foundation of the entire operation. We will delve into the criteria for choosing the right explosive in detail, considering the detonation goal and the specific scenario.
2. **Primer Selection:** In the second stage, we choose the primer, which includes the detonator and booster. This part is responsible for initiating the main explosive precisely. We will analyze how to select the right primer, taking into account compatibility with the main explosive and usage conditions.
3. **Initiation System Selection:** The third stage involves choosing the initiation system, which connects the different blast holes and controls the sequence. We will explain the available options and their benefits, considering the nature of the chosen primer and the operation as a whole.



It's important to realize that this sequence makes sense in the selection process. The main explosive is the central piece that defines how the rock will be broken according to the objectives. The explosive choice aligns with the operational needs.

After selecting the explosive, we move on to primer selection, which needs to be in tune with the explosive and usage conditions. We explore primer options that fit operational requirements.

Finally, with the primer defined, we focus on choosing the initiation system, ensuring that the connection between blast holes is effective and sequencing occurs accurately.

Diving into these stages is essential for explosive and accessory selection. Each stage is a crucial piece of this process, ensuring a successful detonation and excellent results. In today's article, we'll start with the first point, which is the main explosive selection, where we'll make some general comments and finish with a series of points to analyze when determining our explosive. In the next article, we'll delve into more details on each of these points. In the last article of this series, we'll discuss the selection of the most suitable primer for our explosive and the initiation system that allows for a correct and precise detonation.

1 - Main Explosive Selection

When beginning to choose explosives and accessories for our detonation, the crucial first step is the selection of the main explosive. This fundamental component is responsible for breaking the rock according to our objectives and guides our subsequent choices. Besides ensuring the success of the detonation, the main explosive determines which accessories are needed for its application under the previously defined conditions.

Selecting the main explosive involves examining all available options and their characteristics. It is a stage that requires a detailed analysis to find the explosive that best suits our needs. It's important to remember that accessory choices, both for initiation and blast hole connection, are directly linked to the main explosive. They must be compatible with the chosen explosive and suitable for operational conditions.

The explosive we choose is the foundation upon which we build our detonation, shaping our objectives and requirements. However, we should not underestimate the importance of accessories. While their choice is influenced by the type of explosive, these accessories play a vital role in the precise application of the explosive and the overall improvement of detonation performance.

In practice, we do not always have a wide range of choices. Limitations such as exclusive contracts with suppliers, a limited number of suppliers in the region, operational conditions, and costs may outline our options. Despite these constraints, we still have possibilities. It is crucial to understand them well to make the most of the available options, even if they are limited.

Attention is crucial because final decisions on explosives and accessories are often made during contract renewal periods. These are ideal times to evaluate contractual conditions, consider the possibility of changing suppliers, and thus expand or diversify the available explosives and accessories options for the next contract.

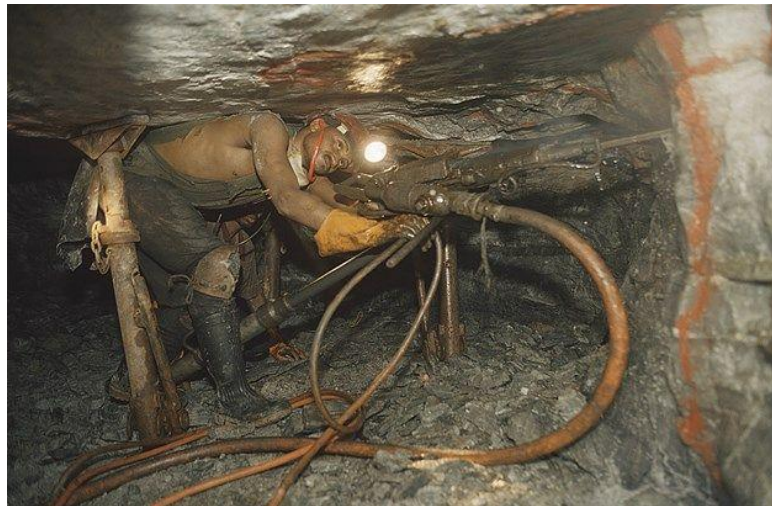
While in individual projects, this analysis may not have a significant impact, in larger, long-term operations like mining, these decisions occur at more extended intervals, every three or five years, depending on the contract's duration. The choice not only affects the present but also shapes the future of operations, determining the effectiveness and results of upcoming detonations.



Criteria Guiding the Choice of the Suitable Explosive

In an ideal world, selecting the right explosive would be a matter of analyzing a series of detailed criteria. However, in practice, some factors play a more significant role, limiting our choices or even determining which explosive we should use. Some notable examples include:

- **Special Conditions:** In certain scenarios, such as areas with explosive atmospheres, reactive rocks, hot terrains, or deep holes, it may be necessary to use specific explosives that meet these conditions. Here, the choice of explosive is directly influenced by the need to meet these specifications, regardless of other criteria.
- **Equipment Characteristics:** The specifics of the equipment used in explosive application can be decisive in choosing the appropriate explosive. The chosen explosive must be compatible with the technical and operational specifications of the equipment.
- **Rock Characteristics:** The nature of the rock to be broken is also important. Some explosives may work better in certain types of rocks, considering factors such as hardness, porosity, and geological structure.
- **Physical and Operational Limitations:** Restrictions like limited space or the need for precision in sensitive areas can influence our choices of explosives.
- **Presence of Water:** Water at the detonation site is a critical factor. In locations with water, waterproof explosives may be necessary to ensure the success of the detonation.



These are just a few examples of the conditions and factors that can affect our choices when selecting the appropriate explosive. Therefore, the first step in explosive selection is always to assess whether any of these conditions or factors are present before considering other criteria. Understanding these variables is essential for making informed and effective decisions in explosive selection.

Selecting Explosives: Evaluation and Criteria

In operational practice, we often already have a standard explosive available for use or, when starting a new operation, we receive recommendations on which explosive to use. In these cases, our choice may involve assessing whether it's necessary to switch explosives, rather than choosing a new explosive from scratch.

The first important step is to thoroughly analyze the current explosive, evaluate how it meets our needs, and identify areas where we want better results. This information is essential to define our selection goals and compare available options based on the current situation.



Whether choosing an explosive for a new operation or considering the replacement of the current explosive, several theoretical and practical criteria must be evaluated to select the most suitable explosive. Here are the key criteria that deserve analysis:

- **Special Conditions:** Special situations, such as the presence of explosive atmospheres or reactive rocks, may require specific explosives.
- **Availability and Flexibility:** The availability of explosives in the market and the ability to adapt to operational variations are important points.
- **Past Results:** The past performance of the explosive in relation to the desired results should be evaluated.
- **Costs:** The financial impact of choosing the explosive should be considered in relation to the benefits.
- **Type of Blasting:** The type of blasting to be performed influences the choice of explosive.
- **Blast Size:** The size of the blast and the amount of rock to be fragmented are relevant factors.
- **sleep time:** The time required for the explosive to stay in the borehole before blasting.
- **Rock Properties:** The composition and characteristics of the rock affect the effectiveness of the explosive.
- **Energy:** The energy released by the explosive affects its fragmentation capacity.
- **Water Presence:** Waterproof explosives may be necessary if there is water on-site.
- **Hole Characteristics:** The diameter, depth, and configuration of the holes influence the choice.
- **Operational Considerations:** Practical aspects related to application and logistics play a relevant role.
- **Team Experience:** The team's experience in handling a specific explosive is important.
- **Environmental Conditions:** Environmental factors should be taken into account.
- **Product Compatibility:** Compatibility between explosives and accessories is essential.
- **Performance in Similar Situations:** Evaluate how the explosive performed in similar operations.

When analyzing and considering these criteria, we can make informed decisions about which explosive to choose. Understanding all of these variables contributes to optimizing the explosive selection and, consequently, the success of the blasting. That's why in our next article, we will continue with this theme, delving a bit more into each of these items.

So that's it, folks, we'll stop here for today. I hope you enjoy these new articles and can comment on any essential items we may have forgotten. Our goal is to always present the topic in a comprehensive way to reflect on the most important points. Of course, today there are already various simulation software that can indicate the most suitable explosive for each blasting, but they still can't weigh all of these factors we're discussing, and not everyone has access or the means to afford the costs of cutting-edge technologies that are available.

As always, please comment and share so that we can have safer and higher-quality blasting!

Blasting Treinamentos is here to help you shape the world with safety and quality.

Rock Blasting Courses:

Português -> <https://lnkd.in/d5eivncS>

English -> <https://lnkd.in/dsrq7PGm>

www.blastingtreinamentos.com

blastingtreinamentos@gmail.com