

Comentários sobre o Desmonte de Rochas com Explosivos

Quality control (Part 01 of 02)

By Bruno Pimentel.

Hello my friends, as always, we start by leaving here the link to our Newsletter, so that those who are new can have access to our previous articles, as well as asking you to subscribe, because that way you will be automatically notified with each new article. Now we are also gradually translating our Newsletter into English, so we will always try to keep up with our publications fortnightly, and in the meantime we will make the previous articles available in English.

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

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

In the last article we talked about the main points taken as central objectives of our blast, which should be the factors taken into account when evaluating its results, because in practice, no matter how perfect we want our blast to be, what really matters is if we are reaching our goals, because having beautiful and technically presentable blasts are only useful if they meet the previously defined goals, and that's why we also commented that goals are the main reference, not only to evaluate blasts, as also for the planning and execution of our blast, which must be based on these same objectives in order to achieve the expected results.

Bearing this in mind, we have a topic that is critical for most operations, and has enormous importance in terms of achieving the objectives and results of the blast, which is quality control, mainly because this control is what will guarantee that we are following the necessary steps to achieve the expected results. So in today's article, we want to comment a little on the need for quality control and we will talk about 4 main classes into which we have divided the necessary basic controls.



But before starting to talk about quality control in the preparation and execution of our blasts, it needs to be clear that in order to control quality, we first need to control the operation, that is, the parameters and how we execute them, because unfortunately this is one of the biggest difficulties we have in operations. For example, we cannot control the quality of the explosive we are using, if we do not have control over the standard parameters of the explosive, or even the amount of explosive and the way we apply this explosive.



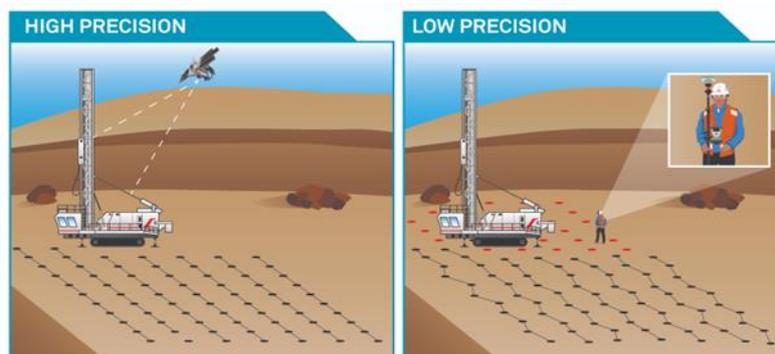
Thus, in any activity, before evaluating the quality, control is essential, especially when we are talking about the activity of blasting rocks with explosives, due to all the complexity that involves the subject, both in terms of safety and harnessing the explosive's energy so that it generates useful work, these controls become even more of a priority.

This is a complex point for many operations, as it is common to always treat this as bureaucracy, paper, etc., but the old saying goes that “information is power”, and we really need to know what is happening, record and analyze it, because in this way we will be able to correctly evaluate our operation. And even more today we can count on the help of various software and equipment that help us in this step, so we will leave an open space to talk about this topic in other articles.

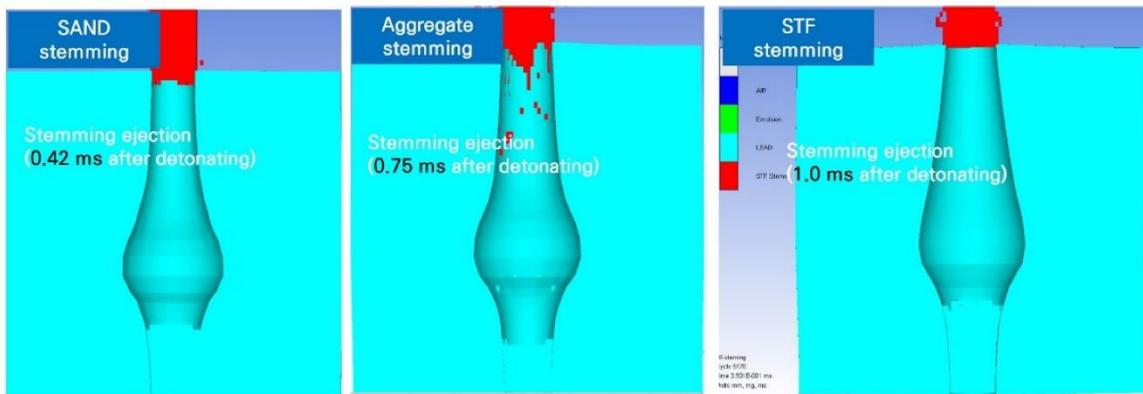
Another point that we always talk about is that we don't control the explosive, and what we need to do is try to direct its energy, and that we do through the correct control of the parameters of application of this explosive, so we need to know where, how, how much and how this explosive will act during our blast, and for that we need to have the right control and information.

So we need to keep in mind that to be able to control the quality of anything or activity, we need to have control over it, and in addition we need to know the basic quality parameters of each one of them well, so that we can accurately assess what is executed. against the standard reference parameter.

For example, we have already seen operations mark the drill pattern in the step, where the person responsible for the drilling had the plan in hand and was marking the holes counting the steps (using the old reference that 1 step is equal to 1 meter), and after the drilling, the person in charge of the blast came to check the drill pattern, measured it also with the step... and I honestly keep asking myself to this day why I didn't put the two together and measure their step with mine, because if the 3 were equal, we could say that we were “step twins”(heheh)...



But leaving the irony of our example aside, we fully understand the complexity we have in the various operations, where in many of them resources are scarce, but it is impossible to evaluate the quality if we don't have control, and this is a point that is indispensable, because for example, to evaluate the stemming quality or its efficiency, we need to measure the stemming, we cannot evaluate if a stemming of 4 meters is adequate, if we are not sure that the stemming is 4 meters, or if it has 3 or even 5 , in addition, we need to evaluate how this stemming is done, and the material we use, and all other characteristics that can be affected during execution.



So, one of the basic functions of the quality control of our blasts must be to ensure that we have adequate controls over the blast parameters, that they can be measured correctly and that we have the baseline standard of reference to make the appropriate comparisons and controls.

In addition, another important point is that when we are going to carry out a quality control, we need to know specifically what we are going to evaluate, because we can do a general quality control, we can evaluate the quality control in relation to the objectives of our blast, or even according to some specific parameter. And this is important to be clear, because there are a series of points that can be observed in a blast, where some of them are simpler, and can be done within the daily routine, and others may need specific measurements and require a more detailed work so that it is carried out correctly.

In a basic way, we need to control the quality of all parameters of our blast plan, and that in all blasts, so that we can have a control and a prediction about the results, but some specific points need to be monitored in a more detailed way, mainly when we are planning to make optimizations in our operations.

It is also important to be clear that we can use qualitative or quantitative measurements/controls/analysis, and this will depend on the scenario and available resources, but it is important to know the different ways of evaluating each parameter of our blast, because, according to the objectives, we may need to use specific techniques, and it is important to be aware that qualitative forms of evaluation will normally depend directly on the knowledge and experience of the person doing the evaluation, while quantitative forms usually need equipment and resources to be carried out.



Usually the quantitative forms of analysis are usually more precise, and nowadays, we have several equipment and software available, which can complement our control techniques, making us more sure of what we are doing, and in turn, making that we can guarantee a better quality of our blasts. But regardless of the scenario or the techniques we use, we need to keep in mind that a good control over the process is essential, both to guarantee its quality, as well as to guarantee the safety of the operation, in the same way that it serves as a basis for us to be constantly improving our operational procedures.

So having all these points and observations in mind, in a very summarized way, when we are talking about quality control of our blasts, we can say that it has 4 main functions:

1 – Ensure that we are designing and executing our blast in the best possible way;

2 – Ensuring that we are following the necessary procedures to have the necessary level of safety for our operation;

3 – Ensure that we can consistently analyze the parameters and results of our blast;

4 – Ensuring control over the parameters of our blast, so that we are able to carry out effective evaluations, changes and optimizations in the process.



In addition, it is important that every operation has an established minimum standard, which ideally will be implemented, and to comply with this standard, quality control must be carried out during all stages of the blast process, because in each of them, we have several variables that can significantly affect the safety, standards and outcome of our blast.

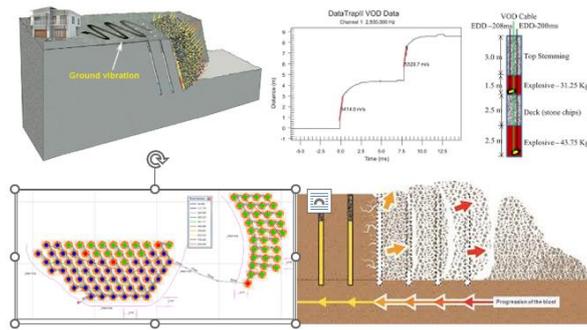
Normally we can separate the controls that we make during the steps of the process, and in a simple way, we can say that we have controls that are performed before, during and after the blast:

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|---|--|---|
| <ul style="list-style-type: none"> ➤ Before • Blast plan quality • Drilling Quality • Choice of Explosive and accessories • Proper rock characterization • Quality of the blast loading operation • others | <ul style="list-style-type: none"> ➤ During • Timing design quality • Explosive performance quality • Control of explosive energy loss • Vibrations and airwaves • Flyrocks • Toxic gases • others | <ul style="list-style-type: none"> ➤ After • Fragmentation Quality • Muck pile • Productivity of loading and transport equipment • Performance of the following fragmentation steps • Costs • others |
|---|--|---|

The controls carried out before the blast need to ensure that the design/planning and preparation of our blast is carried out in the best possible way, where we need to guarantee the quality of the “assumptions” for the execution of the blast plan, such as quality and training. of the labor used, the quality of the drilling that will be performed, or even the activities necessary to provide the basic information for the elaboration of the blast plan, such as the quality of the adequate characterization of the rock, as well as we need to ensure that when we are going to execute the blast plan and do all the loading and preparation activities of our blast, that they maintain the necessary quality level to guarantee a good result.



Then we have the exact moment of the blast, where the explosive is detonating and doing its job of fragmenting the rock, and during the blast's occurrence, there are also a series of factors that we need to control and guarantee its quality, such as a correct sequencing, the velocity of the explosive at the moment of the blast, the vibrations that are generated, and several other points that occur at the moment of the blast and that are and can be a quality index and directly interfere in the final result.

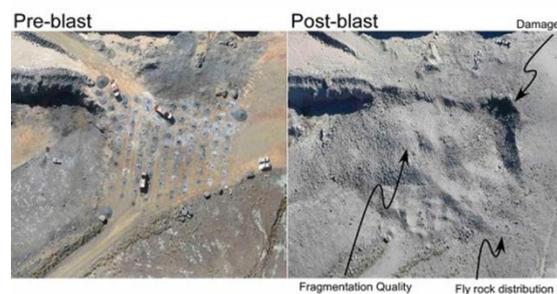


Likewise, after performing the blast, we can control a series of factors, which will indicate the quality of the blast's performance and the results generated, such as the quality of the fragmentation, the format of the material pile, the productivity of excavation equipment and material processing, costs, and other parameters that are mainly based on our blast objectives.



But in order to simplify the quality control process or understanding, we prefer to divide the necessary controls into 4 specific groups, which seek to address the main points present in the rock blasting process:

- Product quality control
- Blast plan quality control
- Operational quality control
- Blast quality control



We will see more details about each of these points in our next article, but in addition to understanding the importance of each of them, we need to understand the interaction and interdependence they have with each other, because for example, we can have an ideal blast plan and the more energetic explosives available, but if we do not have operational quality in the preparation of our blast, we will not apply the prepared plan and probably most of the explosive energy will be wasted, or in a more critical scenario, it will generate several unwanted effects, in the same way that we may have an extremely skilled team, but without the time and resources to carry out the activity, so when we evaluate each point, we also need to ensure that the others are not affecting its quality.

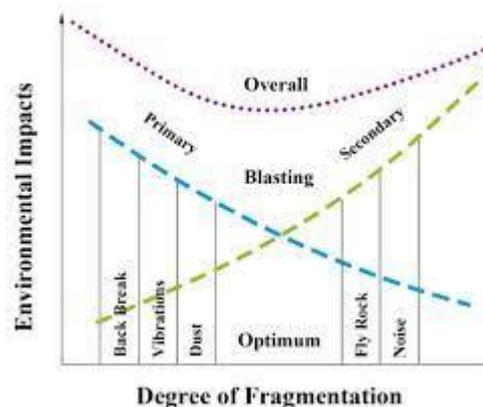
Another factor that can completely change the way we analyze is the scenario of each operation, because for example, when we look at the first point, which is the quality control of the products we use, we may have situations in which we will only use finished products, and so the manufacturer himself must guarantee the final quality of the product, but this quality will change for each manufacturer, in the same way that we need to guarantee the correct way to use these products, on the other hand, we will have products that will be finalized at the time of application, as is the case with pumped explosives, and we will be responsible for guaranteeing the final quality of the product.



When we look at the second point, in addition to evaluating the quality of the blast plan, we need to evaluate the quality of the information available, the ability of the person in charge to analyze this information, and especially the adaptability to the various changes that we have in each blast, as it is very common operations have standard plans and use them in different scenarios expecting the same result, and ensuring that this “standard” is adapted to reality is one of the fundamental points of blast plan quality control.

Our third point is perhaps one of the most difficult to assess and standardize, but it is estimated that operational quality is responsible for up to 80% of the final result of the blast, both in terms of safety and in terms of achieving our goals. It is also directly related to our efficiency in applying the blast plan and using explosives properly.

Finally, we need to control the final quality of our blast, which will be totally linked to the objectives and needs of each blast, where we must evaluate the limits, fragmentation, costs and all previously established objectives, but so that we can have control and correctly evaluate these results, we need that all the previous steps have fulfilled their roles, and thus we will be able to carry out a better prediction and evaluation.



Well that's it folks, for today we will stop here, but we will continue with the topic in our next article, where we will comment in more detail each of these points, so as always, please comment and share, so that we have blasts every time safer and better quality!!

In the same way that we are open to suggestions and if you have any article you want to share, the space is always open!!!

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