

## Precision Planning

Keep blasts within legal limits, and communicate schedules for better neighbor relations.

Plan blasts to achieve goals for future growth, including quality benches, floors, and roads.

Experienced blast designers can create an ideal muckpile to address both production and product needs.

Cost-effective breakage begins in the pit.



# AGGREGATES MANAGER

## Precision Planning

The most cost-effective breakage for a quarry begins with the blast. And good or bad, a blast affects everything in the pit — from loading to crushing, right down to reclamation and the future of the quarry.

Whether a company chooses to handle blasting in-house or through a contractor, what lies at the root of cost-effective and productive blasting are knowledge and experience. And best blasting practices can help a producer's bottom line through increased production, better quality production, and reduced costs.

In order to meet these goals, the blast design takes numerous things into consideration. These include the following factors:

### Look at current market needs.

What type of projects will the stone be used for? According to Joel Raines, superintendent for Dunlap, Tenn.-based Dunlap Stone Inc., a road job might need coarser stone, or there might be a market need for more fines. A good blast design can help producers meet their product needs from the moment the stone hits the ground.

**Address future needs.** "Your next shot is no better than the wall you leave," notes David Wilson, area production manager for Rogers Group Inc., based in Nashville, Tenn. "When you're planning each shot, you have to look at your mine plan, in addition to everything else."

**Blast for safe benches, walls, floors, and roads.** Floor irregularity can affect operator comfort,

creating fatigue, at the same time that it can wear equipment faster. "You have to know your geology," Wilson says. "Different seams require different pit development techniques. In some instances you're able to work along a smooth horizontal seam creating a neat quarry floor, in others you have to utilize your pit loading equipment to carry a floor across diagonal or near vertical seams."

### Blast for a good muckpile.

"Managing your cost per ton begins with shot design," Wilson says. "Design often determines the quality of your muckpile, which in turn greatly impacts cycle times. If you have an irregular floor, or over-size material that needs secondary breakage, it slows down the loader."

Raines agrees, adding that a poor toe can leave a "step" for the loader to deal with. "It's not only a nightmare to load, but the next shot will make it worse," he says.

In addition, according to Matt Landis, division president for Austin Powder Co., the blaster should also be aware of what type of loading process is used in the plant — such as a loader, excavator, or shovel — because the blast can be designed accordingly.

**Blast for the crusher.** Landis notes that fragmentation size is definitely controllable in the blast. "The blaster should be able to produce good fragmentation and uniformity for the loader and the crusher. The blaster should also be able to avoid things such as too many fines, which can lead to processing issues," he says.

# OPERATING Smart Strategies

## 1 Contract it or stay in-house?



It's a question every producer has considered — for both drilling and blasting. The drilling decision is usually based on how busy a site or multiple sites can keep an in-house drill. The blasting decision must take into account regulatory and security issues, as well as employee knowledge and experience. A cost-per-ton analysis will help, if it takes into account the need for total quarry efficiency, from blast through loading, processing, and the stockpile.

## 4 Design blasts to build the quarry



In any quarry, a future shot will only be as good as the wall left by a prior shot. And the blast design will shape the future life of the quarry, in addition to putting rock on the ground. The blast requires complete quarry planning as part of the design. In addition, as the blasts work to create walls, benches, floors, and roads, proper design and better blasts will help to preserve equipment — reducing tire and equipment wear — as well as operator strain.

# TECHNIQUES ILLUSTRATED

## Strategies for Better Drilling and Blasting

### OUR EXPERTS

#### 2 Blast for the loader



The ideal blast design will create a better muckpile for the loader, shovel, or trackhoe. An experienced blaster will know how to shoot for a specific loading method. The blast should target shape, looseness, and fragment size distribution to help with the loading cycle times and improve productivity at the face. Oversize material is more than a nuisance to the loader; secondary breakage slows productivity down the line. And an irregular toe will not only adversely affect the loader, but it also can create problems with subsequent shots.

#### 3 Shoot for the crusher



The best blast is designed with a "mined-mill" approach, creating a better product from the beginning of the process and taking it to the crusher. The blast can affect fragmentation size, which is controllable if an experienced blasting professional designs it. From a market standpoint, a good blaster should be able to create a shot that will help the producer to cost-effectively process materials as dictated by current sales needs.



Matt Landis, president of Austin Powder Co.'s MidSouth LLC Division, has 28 years of experience in the explosives business, having handled a wide variety of responsibilities over the years. His experience has related to all types of applications, including underground, quarrying, coal, and hard rock mining. Landis is currently based in Nashville, Tenn.

#### 5 Aim for better neighbor relations



Vibration and airblast top the list of neighbor complaints associated with quarry blasting, where perception can rule neighbor emotions. The best practice is to be proactive with neighbors. Make sure the blast design and process take neighbors into account, staying well within legal limits and providing warnings — such as calling businesses and homes — before the blast. The use of monitors with every blast can provide a reference for followup to possible neighbor complaints.

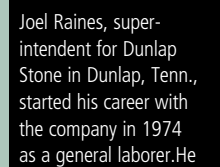
#### 6 Keep detailed records



The shot report, which should include all parameters before, during, and after the blast — from a pre-blast survey and layout to the type and amount of blast materials and seismographic records — is a must. Not only is it invaluable for tracking cost efficiencies and planning for future production needs, but it also will provide an accurate record for regulatory agencies and can be used to answer questions or even future litigation that might come from unhappy neighbors.



Rogers Group Inc. area production manager David Wilson started his career in aggregates 32 years ago as a general laborer for a Vulcan Materials Co. plant. Prior to becoming an area production manager, he worked as an operations superintendent and an assistant area production manager. He has been with Rogers Group since 1999.



Joel Raines, superintendent for Dunlap Stone in Dunlap, Tenn., started his career with the company in 1974 as a general laborer. He was a driller and a loader operator for the company, prior to becoming a foreman and a supervisor. As Dunlap Stone grew to include three additional plants, Raines was involved in their planning and operation. As superintendent, he oversees processing at all four plants.

# OPERATIONS ILLUSTRATED

## Voices of Experience

**Matt Landis** ▼

**F**rom a bottom-line standpoint, the question of whether to keep a drill and/or blast professional on staff, or to use a blasting contractor, is an age-old, multiple-choice question.

"You have to separate the processes and look at both your drilling and your blasting," says Matt Landis, Nashville, Tenn.-based division president for Austin Powder Co. of Cleveland, Ohio. "You can handle your drilling in-house and contract your blasting. Or you can contract your drilling, but do blasting in-house. Or you can contract all of it out." The decision is very subjective for each company, and sometimes different sites and facilities within a company might benefit better from different solutions, he adds.

"If you own a drill, you need to ask yourself how busy can you keep the drill between multiple sites or at one location? If your yearly production is under 2.5 million tons, it can be hard to justify the capital and labor necessary for a drill," Landis says.

Regardless of the ultimate decision about who handles the drilling and blasting, the success of a quarry's blasting program is based almost entirely on its design. The blast must take into account the quarry's mine plan, the geology, safety, and proximity of neighbors. And Landis says that planning for all variables can be daunting for some producers. "You don't know where or what your next shot will be until you shoot this one," he says, adding that planning can provide a real picture for cost.

"The producer wants us to reduce their costs, and we can actually shoot for X cents per ton — anywhere from a few cents up to a couple dollars per ton — but the best number for cost is the one that puts the right amount of quality rock on the ground to affect the total cost of running the plant," Landis says.

**David Wilson**

**W**hether with neighbors or new employees, lack of education about the true effects of blasting can affect day-to-day operation in a quarry. David Wilson, area production manager for Nashville, Tenn.-based Rogers Group, says he believes that documentation can help to educate and answer questions.

At each location, education begins at the top. To that end, Rogers Group recently created a "standard operating procedure" manual for its drilling and blasting program. "In times past, superintendents had years of experience in all facets of quarry operations and typically worked at one site for many years," Wilson notes. "But today, with higher management turnover and more narrow fields of expertise combined, with the prevalence of contracted drilling and blasting, supervisors might not be as pit-savvy as they used to be."

Rogers' manual provides definitions to clarify terminology," he says. "It also contains information on the quarry mine plan, regulatory requirements, site-specific restrictions, and procedures. This especially helps when supervisors cover multiple or new sites. Finally, it covers the procedures on shot day." Wilson says the manual includes a checklist for supervisors to complete to ensure they have covered all requirements for a specific location.

The shot report is invaluable, not only for mine planning, but also as a means to educate personnel and neighbors. "The shot report includes the pre-blast survey and layout. The drillers get it, and they log every drill hole detail," says Wilson. "The blaster uses it then to load the shot, knowing the parameter of every bore hole. After the rock is on the ground, the supervisor and blaster sign off on the performance of the shot and the report goes into the book."

**Joel Raines** ▼

**“W**e contract our drilling and blasting now, but years ago we did our own,” says Joel Raines, superintendent for Dunlap Stone Inc., a Dunlap, Tenn.-based company that operates three limestone quarries and one sand quarry. "Either way, one big key to success is communication between the plant, the driller, and the blaster."

Raines says that, for long-term and short-term planning, every shot affects the next shot, and he makes it a point to stay involved with not only where and when the next shot will take place at each facility, but also how big and what the design of the blast will be. "I look at the wall left by the last shot, profiling it to predict things such as flyrock. We have walls from 27 feet to over 100 feet. And MSHA wants us to bench the high walls, but a slower economy means it's going to take longer to bench them," he says, explaining that proper communication will help to create the best possible blast while addressing all variables.

And communication for the blasting plan is not just a three-way street for Raines, limited to talking with the driller and the blaster. He also believes that communication with operators in the plant can provide valuable feedback for the drilling and blasting plan. "Especially with a new plant — such as when we bought our sand plant — it was a whole different ballgame than shooting limestone. As we were learning how to shoot at that plant, we talked to the loader and crusher operators." Raines says that through operator feedback, the design was refined at the sand plant, pulling the pattern in from a standard 15 by 14 to an 8 by 8.

"It takes experience to know what you're looking at," he says. "You have to stay involved. I have the experience here, so I'm the last man there when they sound the horn. I'm the contact man with the blaster on every shot."