



Highway full-depth repair often requires an equipment-mounted drill for mobility and productivity.

PHOTO: E-Z DRILL INC.

# Drill It Down

## Choosing the proper concrete dowel drill for full-depth repairs or new pavement.

**T**echnology leads to better, faster, easier-to-maintain equipment, increases uptime, and makes the jobsite more efficient. In the concrete paving industry, we have seen this trend in significant changes to dowel drilling equipment. Once, only one option existed: handheld models. When the first machine, a hydraulic drill, was launched more than 30 years ago, it was the first real innovation to this equipment. Higher production was possible, and less backbreaking manual labor was required.

Although hydraulic drills were a step in the right direction, they were accompanied by many drawbacks including the need for additional equipment not

commonly found on the jobsite, the risk of hydraulic fluid spills, and time-consuming and costly maintenance protocols. Soon, a third option became available: pneumatic drill systems, which have become the equipment of choice, essentially becoming the industry standard. Pneumatic drills operate using an air compressor—common equipment on many worksites. This eliminates the need to purchase additional equipment and the chance of messy hydraulic fluid spills. And pneumatic drills are low maintenance, and designed for precision, accuracy, and high production—all crucial when faced with the tight specifications and even tighter deadlines common on today's projects.

### Know the options

Although the choice of pneumatic versus handheld or hydraulic may be an easy one, it's not the only decision. Just as the product evolved from handheld through hydraulic to pneumatic, it has continued to advance in other ways. Pneumatic drills are offered in various styles, differing in operation, production capabilities, and more. A basic understanding of how each model operates and how the application and jobsite factors enter into the decision will help contractors make the best selection.

There are three primary categories of pneumatic concrete dowel drills: on-grade, slab-rider, and equipment-mounted. Though each achieves the same end-result, their design and operational characteristics differ greatly.

As the name implies, an on-grade drill mounts on the subgrade level. It may be stationary and placed as needed, or have wheels that allow it to move along the surface. Most on-grade drills are smaller than other options, making them easy to move and reposition. Even



**On-grade models operate from the subgrade level and are easy to position from one patch to the next.** PHOTO: E-Z DRILL INC.

larger, self-propelled on-grade models are designed to allow fast repositioning and smooth, accurate operation.

Though they operate in much the same way as on-grade models, slab-rider drills work from on top of the slab and leave the subgrade undisturbed. Slab-riders are typically larger in size than on-grade models; some are self-propelled to reduce operator fatigue and allow the unit to move quickly to the next drilling area. For versatility, some slab-riders can be converted for on-grade operation, which is especially useful for contractors that do a variety of drilling projects.

An equipment-mounted drill is attached to a large machine, such as a backhoe, and mounts on and references from the slab. The backhoe operator positions the drill, while the drill operator guides it into place from the ground level, making for a simple and efficient two-person operation.

Equipment-mounted models are designed for fast positioning, some with 360-degree capabilities to quickly drill opposite sides of a slab opening without having to move the carrier machine. Others feature adjustable spacing and precise shifting that allow accuracy on large slabs requiring numerous, identical holes.

The three different classes all offer various gang options. Both on-grade

and slab-rider models are available in single-gang configurations, while all three offer multigang configurations, ranging from two to five gangs.

#### Scratching the surface

Drill selection should be equated to one primary factor: application. All characteristics of the job must be considered, but a major factor is how many total holes will be drilled. Combine that with outside factors, such as conditions, deadlines, and expected production rate. Is the drilling going to be limited to only a few hours a day? Does the deadline require a faster-than-usual production rate? It's important to ask these questions to understand how the drill choice affects the project.

When deciding on a drill, first and foremost consider the scope of the concrete paving project. A residential curb-and-gutter pour requires a different drill than a large airport paving job. Also examine other job factors, such as space, subgrade provisions, and mobility. Space alone can determine the model of drill. If space is limited and only a few inches of slab are exposed, a slab-rider is eliminated and on-grade is the best choice. Limited space also may determine the number of gangs on the drill. Conversely, on larger projects, space is not an issue and a large slab-rider model is the ideal choice. Self-propelled units can move

along these projects easily, while also towing the air compressor for added efficiency and reduced labor.

Specification issues may restrict model choice. Engineers often specify that the subgrade remain undisturbed, thus, eliminating on-grade models. And, though their accuracy is nearly identical, some engineers tend to favor slab-rider models, thinking that operating off a slab allows fewer variances than operating off the subgrade. Though such restrictions are uncommon in new construction, they occur more frequently in repair work and lead to a slab-rider or equipment-mounted selection.

Patch size also may dictate the drill choice. A job requiring patches only 3 feet wide is going to require a smaller drill—often a single-gang unit—and an on-grade model is the only drill compact enough to be suitable.

Transportability also affects drill choice. An on-grade drill is lightest and easiest to transport. The ability to fit in a pickup bed and its easy loading and unloading qualities make it desirable when it may need to be moved often. Because of its larger size and weight, a slab-rider drill must be loaded onto a

#### Stitching Cracks and Joints

On some cracks or joints, doweling can be avoided altogether. This repair using Roadware Concrete Mender, a structural polyurethane, bonds the crack with "microdoweling." This crack at the Cincinnati International Airport remains fully bonded today after six years of service. —William D. Palmer Jr.



PHOTO: ROADWARE

trailer and towed, and may require a forklift to place it. But because a slab-rider is wheel-mounted, self-propelled, and doesn't need to be placed down in the subgrade, it quickly and easily moves from one patch to the next. This makes a slab-rider ideal for full-depth

repair jobs where patches are located in close proximity to one another.

Larger full-depth highway repair projects often consist of multiple intermittent patches spread across hundreds of feet. From a mobility standpoint, these projects almost exclusively

require an equipment-mounted model. Rather than load an on-grade or slab-rider drill and move it to each patch, an equipment-mounted drill remains attached, and is lifted and driven to the next patch by the carrier machine.

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### How many holes

Choosing between a single- or multi-gang model is the next consideration. Because every project has different requirements for the number of holes needed, drills are offered with different gang options. Maximum efficiency is key in gang selection. Although it may seem like a five-gang drill is going to be faster and more productive than a single-gang drill, it actually may

### Dowel Bar Replacement

An alternative to full-depth repairs and drilling for new dowels is a process called dowel bar replacement (DBR). Because concrete pavements often fail at the joints, DBR has been used successfully to restore the stability of joints. The process is simple: cut a slot across the deteriorated joint, place an epoxy-coated steel dowel bar, fill the slot with a nonshrink concrete grout, and diamond grind the pavement surface to restore smoothness. A recent project on US 195 in Spokane, Wash., had Acme Concrete Paving, Spokane, installing 8500 dowels and filling the slots with CTS Cement's Rapid Set DOT Repair Mix. About 100 tons of this repair grout were used prior to diamond grinding to smooth the surface, realign the panel edges, reduce tire noise, and remove ruts from studded tires. This, and other quick-setting mixes, helps to get traffic flowing again since lanes can be reopened within 45 minutes of concrete placement. DBR has proven to effectively rehabilitate pavements for another 15 or 20 years of service. For more information on DBR, go to <http://go.hw.net/cc-dbr>. —William D. Palmer Jr.



PHOTO: CTS CEMENT

be overkill and inefficient. It's simply not cost-effective to purchase a more expensive multigang unit when a single-gang drill is capable of doing the job to spec and production requirements. And air requirements increase with each gang since each operates

independently and requires a certain CFM from the air compressor. A five-gang drill may be inoperable with a small air compressor.

When looking at gang options, a starting point is the total number of drilled holes. A single-gang drill is ideal

for jobs requiring several hundred to just a few thousand holes. With 5,000 to 10,000 holes to drill, a two-gang drill may be more appropriate, and so on up to the largest multigang models.

### Drilling even deeper

Although a project may have several thousand holes, jobsite conditions can limit how many are drilled at once and a single-gang unit may be more efficient. Or, a job requiring just a few thousand holes but with a tight deadline, may require a higher production drill. Some jobsites only allow a set number of holes to be drilled at a time. Concrete needs to set before it can be drilled into, and often several individual pours are required on a project. When looking at the sheer volume of holes only, a five-gang drill may seem warranted but further examination of the project's logistics may conclude a smaller drill will be more economical.

In addition, the project specification may define that work can only be done between certain hours of the day or night, especially on busy interstate projects where minimal traffic interruption is allowed. With only a short window of time each day allotted for drilling, production must be high even if the total hole count isn't, and a multigang model might be necessary.

When the final choice is made, one remaining factor needs to be considered. Consider, not just the job at hand, but the primary type of work the company or agency does. A drill is an investment, so be sure it's going to fit long-term needs, not just for a single project.

The different options available in concrete dowel drills are abundant. Find the ideal drill for every unique project. Whether it's a single-gang slab-rider, multigang on-grade, or equipment-mounted, the proper unit will ensure high productivity and maximum efficiency. To be sure the best choice is made, get below the surface of the application—drill into the details. **CC**

*Randy Stevens is vice president of sales for E-Z Drill Inc., Stillwater, Okla.*

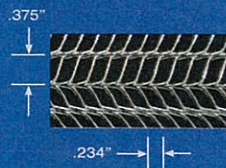
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