

## Wet-Mix or Dry-Mix Shotcrete... or Both?

by Craig McDonald

**F**or some, it may seem inconceivable, but a few equipment manufacturers produce machines capable of both wet-mix and dry-mix shotcrete spraying without converting the equipment. The method these machines use is known as the wet-thin stream method of conveyance.

The design is based on the rotor-style dry process machine. The rotors, however, are designed for the wet process as well. This is achieved by equipping the machine with a low-profile rotor with large-diameter ports, which allows the wet-mix to drop into the ports and be pneumatically conveyed through the hose to the nozzle. The hoppers are fastened with rubber mounts and equipped with vibrators that assist the material in flowing into the rotor.

As with any different type of system, there are pros and cons. The wet/dry rotor-style machine will not convey material at as low a slump as a traditional concrete pump. Required slump for the wet-thin stream method is 6 in. (152 mm) or higher. One of the major benefits is that the concrete (shotcrete) is not required to be pumpable. A typical pumpable shotcrete mixture proportion requires a minimum

volume of paste (water, cement, other supplementary cementing materials, and air constitute the paste phase that lubricates the particles and a portion of the hose) and a particular shape and gradation (ratio) of both the fine and coarse aggregates. In the wet-thin stream method of concrete conveyance, these pumpability requirements are no longer an issue, thus, a wider range of shotcrete mixtures may be used. In fact, coarser mixture proportions are recommended to help keep the hose clean while conveying the material. Also, these machines can be driven solely by compressed air or by a combination of compressed air and an electric motor to reduce the size of the air compressor.

Although production capabilities are generally higher using the wet-mix process than the dry-mix process, many contractors—particularly in the underground sector—have opted to use the wet/dry equipment because of its versatility. With wet/dry equipment, contractors are capable of spraying shotcrete at different sites with different processes with only one piece of equipment and all the same spare parts and conveyance hoses. There are also

# Shotcrete Corner



*Wet/dry-shotcrete machine—rotary barrel type (continuous feed)*



*Tunnel portal—robotic shotcrete application*

other less obvious advantages to using a wet/dry machine to spray wet-mix shotcrete. Requiring only compressed air for operation eliminates the need for an electric power supply, and the elimination of diesel engines required to run a conventional concrete pump means a cleaner underground operating environment.

Although it may not be the answer to all wet-mix shotcrete applications, the wet/dry rotor-style shotcrete machine has proven to be a cost-effective and versatile means of applying shotcrete all over the world.



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