Introducing New Technology to the Jobsite

by Terry J. Fricks

When people think of innovative industries, the construction industry is not likely to be the first one that occurs to them. But while it is true that, for most people, exciting new technology is usually represented by such products as laptop computers and space shuttles, the concrete construction industry has not been asleep. New technology is found in admixtures, toppings, and reinforcing, and is also seen in the equipment that delivers, places, and finishes concrete.

Evaluating the costs and benefits of innovation can be difficult. You need to look at the long-term effect on the eventual owner (is it fair to experiment on someone else's project?), your corporate image (will you be viewed as innovative, or risky?), and your employees (how will innovation affect morale, turnover, ability to attract qualified help?).

The laser screed is a good example of the type of new technology that must be evaluated from these perspectives. This piece of equipment has been on the market since 1986, but many people are still uncertain as to exactly where it fits in the business of concrete placing and finishing. What problems are solved by the laser screed, and what problems does it create?

Machine capabilities

The laser screed is a ride-on machine with a laser-guided screed at the end of a 20 ft (6 m) long telescopic boom. An on-board computer monitors the floor profile by laser and adjusts the screed level 5 times per second. The self-levelling vibratory screed consolidates the concrete, which is dispersed by an auger. With a laser screed, a single crew can consistently place and finish 15,000 to 20,000 ft^2 (1394 to 1858 m^2) of F_F35 concrete floor per day.

It can be argued that the same amount (and quality) of work can be accomplished without the laser screed (and its associated $165,000 investment) by using more people. It can also be argued that most jobs don't require 20,000 ft^2 of concrete floor to be placed and finished in one day, so a single crew could still do the job without a laser screed — it would just take a little longer.

Both of these arguments are true, so why bother with a laser screed?

Personnel

We all know how difficult it is to find and keep good foremen and superintendents. The same is true for laborers and finishers. The situation is even more difficult if you are operating out of town and either:

- sending a large crew out and paying transportation and per diem,
- using a composite crew consisting of some of your own people and some local talent, or
- operating with all local talent.

By reducing the crew size, the logistics of out-of-town operations become much simpler and much less expensive. Fewer talented people willing to spend time away from their families have to be found; fewer highly qualified local people need to be recruited, trained, and managed.

The issue becomes one of excellence, not production. There are a limited number of highly-qualified and motivated people in the concrete construction industry. Tools such as the laser screed enable you to make better use of scarce manpower resources. You can hire, pay, retain, and manage a smaller number of more qualified and committed professionals and still meet performance objectives. Your company can be more selective in its hiring, accepting only the best.

Limitations

The most significant limitation to using the laser screed is that it is only practical for larger jobs [more than 50,000 ft^2 (4645 m^2)]. Other limitations are primarily related to the laser screed's size and weight. A fairly large door is needed, and light reinforcement won't stand up to the machine's weight. It also has problems with soft subgrade, styrofoam, and polyethylene.

Case study

Fricks Floor Systems, Inc., was selected to install the floor at the new Wakefern Distribution Center in South Brunswick, New Jersey. The specifications required 6 in. (152 mm) of 4000 psi (27.6 MPa) concrete, #4 rebars spaced 12 in. (305

POINT OF VIEW This article was selected for reader interest by the editors; however, the opinions expressed by the author are not necessarily those of the American Concrete Institute. The editors invite comments from our readers about the personal views given in this article.

mm) on center, 2 lb/ft² (98 kg/m²) of broadcast traprock topping, and a minimum acceptable flatness of F_F30. The concrete was to be placed directly on a compacted sand base.

Approximately 17,500 ft² (1625 m²) of concrete were placed each day. Throughout the majority of the project, the crew consisted of:

1 superintendent,
1 foreman,
5 finishers,
1 finisher operating the laser screed,
7 local union finishers (for routine finishing).

None of the union crew had any experience in working with a laser screed and several resented the amount of union labor that it replaced. But attitudes changed once the project began.

The finisher who operated the laser screed got a great deal of satisfaction out of the speed and accuracy it permitted, and enjoyed the opportunity to learn a new skill. The rest of the crew soon realized that the laser screed eliminated a lot of work, but not the actual finishing work that required the finesse of a professional. There was also a lot of pride associated with placing 17,500 ft² of traprock-topped concrete each day, and consistently exceeding the minimum F_F30 specification.

The general contractor and owner were pleased with a system that could make such rapid progress because the New Jersey winter was fast approaching. When you cannot predict the number of days on which concreting will be permitted, it is reassuring to know that each working day is maximally productive. The floor slab was completed on schedule and within budget, with an average $F_F42.6$, $F_L44.4$

The schedule and budget were met because of the people, not because of the laser screed. The laser screed made the project more affordable (by increasing productivity) and more manageable (by reducing crew size). The laser screed was introduced carefully, in such a way that all of the people involved — owner, general contractor, concrete crew — understood how they would benefit from the new technology.

Technology cannot be any better than the people using it. If the users resent the technology, the anticipated productivity will not be realized and the investment of time and money will be lost. When properly introduced, however, new technology provides an opportunity for the best to do even better.

Most owners aren't really very concerned with your use of technology: they want results. Technology was not the reason that Fricks was awarded the Wakefern floor contract, but the on-job performance and the finished product demonstrated the value of the laser screed technology. Owners like technology that produces a good product, but have little sympathy for technology that produces excuses.

Selected for reader interest by the editors.

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?ueries on Concrete

New questions

Here are some questions for you, our readers, to answer. If you have an answer — or if you have a question or a problem your fellow readers might help to solve, send them to the Queries Editor at the address given in the shaded box.

1. Is it possible for corrosion to occur in reinforcing steel when concrete is not badly cracked? How does it happen?

2. How can communications be optimized between the concrete producer, the concrete testing lab, and the engineer during concrete placement at a construction site?

3. What causes "reflection cracking" in concrete. How can it be avoided?

4. How do the particle shapes of fines affect the quality of the concrete in which it is used?

5. What is "quality concrete," and what factors prevent obtaining it?

Do you have a question or a problem your fellow readers might help to solve? Or an answer to a question you've read here in QUERIES ON CONCRETE? If so, please send them to:

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(Questions and answers should be typewritten and double spaced. Longer answers that have been word-processed are welcome on computer disk.)