Special Report: Spec Chart/Trends—Pavers

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Silo specialist cuts costs by 15% using jumpforming

Jumpforming method reduces silo costs

THE MOST ECONOMICAL and fastest way to build concrete silos is by slipforming. Right?

Wrong. According to Calvin Schmidt, they should be jumpformed. And he should know. He's been in involved in silo work for 27 years, the past 17 as head of his own business, MWI Silo Systems Inc., based in Wellesley, Ont.

Schmidt has become a firm believer in jumpforming the tall, circular, thin-wall structures as opposed to the more common method of slipforming. The prime difference between the two methods is speed; jumpforming calls for the silo to rise during the day shift only, whereas slipforming involves continuous, around-the-clock construction.

Schmidt has built at least 500 silos, most of them in Ontario, either as a subcontractor or as a general contractor, for cement and grain companies, farmers and wood industries.

He admits a silo of his will climb more slowly when it is being jumpformed rather than being slipformed. But he says that in most cases his overall site time will be slightly less because so little mobilization and demobilization time is required. "We can be ready to start jumpforming in one day, or as many as five days, depending on silo diameter. On a slipforming job, it might mean three or four weeks."

The biggest attraction for the owner is economics, Schmidt says. "Jumpform normally comes in around 15% less costly than the same thing done in a slip. That's a pretty decent rule of thumb. But there are exceptions, depending on complexities."

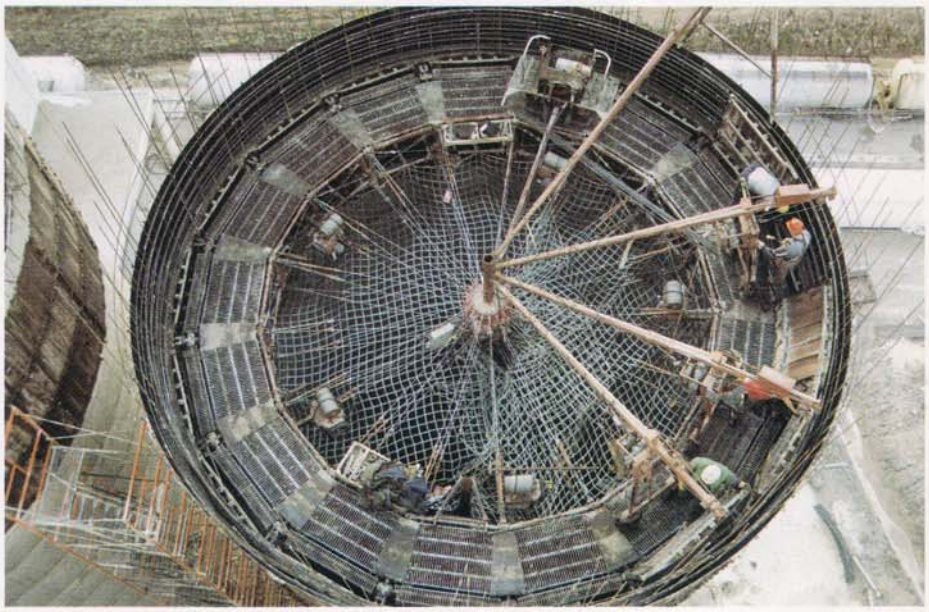
The biggest saving is in labour. Schmidt's jumpform crew is usually between three and 10 people, again related to the diameter. In any case, the MWI crew is much smaller than a double-shift slipform operation. Furthermore, there is little overtime on an MWI job because there is no nighttime concreting. Also, the crew rarely has to work in bad weather.

Another advantage of the jumpform technique is that Schmidt's crew has more time to check rebar spacing. "On a slip operation, inspection is difficult because the rebar gets quickly buried in concrete. A design engineer will normally add 20% more rebar to the design in a slip."

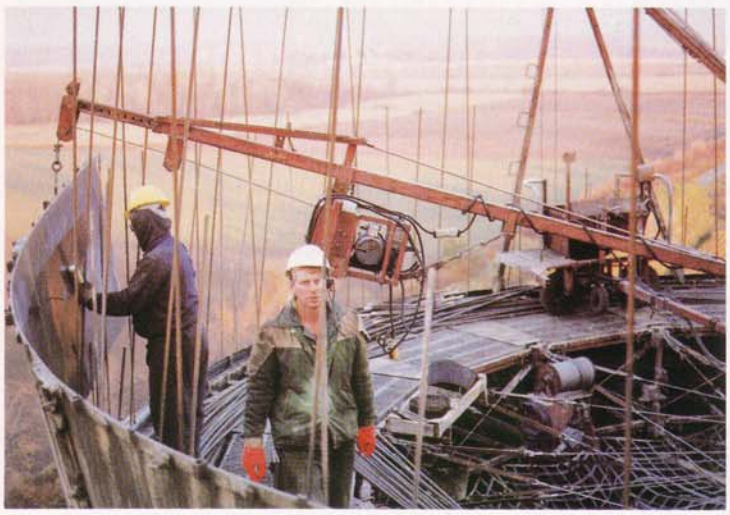
Schmidt's company recently finished a double-silo job near Woodstock, Ont., for construction manager Frid Construction Ltd., Hamilton.

The 10.6 m dia silos, which now contain 5200 tonnes of powdered cement each, are the same size as four older silos slipformed years ago. But the silo height—50 m—was a record for MWI.

Schmidt's entire Woodstock job, including foundations and roof work, took three and a half months. (That included hopper work done by others.) Actual jumpforming time spanned 11 weeks, with both structures climbing at once. The workers averaged two 1.2 m high courses a day per silo; they could



WOODSTOCK JOB using MWI's jumpform system involved smaller crew than slipform operation. Instead of using expensive, long-reach cranes to bring up materials, lifting was done by self-climbing form system.



JIB CRANE is used to adjust form. Concrete and rebar were brought up by electric hoist.

JUMPFORMING time spanned 11 weeks, with both silos climbing at once.

have done three if there had been less rebar, he says.

Instead of using expensive, long-reach cranes to bring up concrete, rebar and forms as the silo grows, the materials are handled by a self-climbing form system sitting atop the structure. The system comes with adjustable steel forms, work platform, hoist, jib cranes, concrete bucket and powered concrete distributor buggy.

Schmidt outlines the step-by-step procedure once work is off the ground:

- Rebar is hoisted to the work platform;
- Outside circumferential forms are lifted and set;
- Rebar is tied into place;
- Inside forms are lifted and set;
- Work platform is raised 1.2 m;
- Concrete is poured.

The procedure is repeated up to three times a day. "The concrete that's poured first in the morning is the first to be stripped next morning," Schmidt says.

Each Woodstock silo rose with the concrete capped with formwork 3.6 m high, comprising three courses of curved forms stacked one on top of each other. Each course consisted of 17 form modules, with the modules measuring 1.2x1.9 m. Adjustable tiebars on the forms allows the crew to change curvature for different diameter jobs.

The designer on the Woodstock job, Consultec Ltd., Toronto, specified that the inside diameters of each silo had to vary. The diameter was increased to 10.4 m from 9.7 m at the point where the top of the hoppers would be. Wall thickness came in two sizes: 560 mm for the bottom 10.4 m of silo, which contains the hopper, and 250 mm for the rest. (For silos smaller than 9 m in diameter, the MWI forming system incorporates fixed-diameter modules; for larger silos, however, the modules can be enlarged in 0.6 m increments up to a maximum diameter of 22 m.)

The use of metal forms on a jumpform job also introduces an element of economy. First, a smooth exterior is created, ruling out time-consuming finishing work often associated with slipforming. Second, the metal forms are reusable. "On a slip job, the wooden forms come down and are destroyed," Schmidt says.

On the Woodstock's job, the modules were repositioned by three wheel-mounted jib cranes which travelled on the outside edge of the work platform. Each jib crane was basically a small boom with linear actuators which extended and retracted the boom. The booms pivoted from a suspended pole at the centre of the silo. The pole also stabilized the platform and a safety net with cables, like the spokes of a bicycle wheel.

Heavier items, such as concrete and rebar, were lifted by a ground-operated high-speed electric hoist with an A-frame on the platform. Concrete, supplied by CBM, Ingersoll, came up in a tiny bucket which was dumped into a rubber-tire buggy at working level. Five Skyclimbers, or electric-powered winches, were used to raise the platform.

Schmidt says he alternated back and forth from one silo to the other. "While we pouring on one silo, we were setting forms on the other."

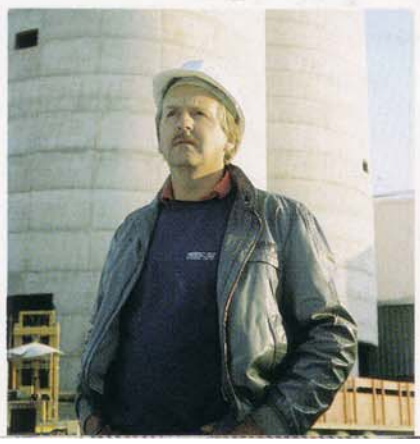
MWI purchased about 230 tonnes of rebar from Harris Steel, London, in 4.5 m and 6 m lengths for silo walls and foundations. As a cost-cutting measure, Schmidt advocated the use of a hand-held rebar bending and cutting tool for difficult areas, such as the foundation, door openings in the wall and roof beam pockets.

"It more than paid for itself on the Woodstock job," he says. The Nova Press unit, used on 5% of the rebar, was bought from Gensco Equipment Co. Ltd., Toronto. ♠

MWI wins NS job

MWI Silo Systems Inc. sometimes tackles a silo project not as a general contractor or as a subcontractor but as the prime equipment supplier. Recently the firm was awarded a contract to provide its forming system and supervisory personnel for a job in Nova Scotia.

MWI's contract is with forming contractor Able Equipment Ltd. Dartmouth, N.S., which plans to jumpform a pair of 18 m dia coal storage silos. General contractor on the $3-million job is Rocca Construction Ltd., Dartmouth. The 45 m high silos will raise this spring on a site near New Glasgow, for Westray Coal, a division of Curragh Resources Inc., Toronto.



CALVIN SCHMIDT, president of MWI, has built at least 500 silos.