

New concrete paves way for longer building term

'ARCTICRETE': A new formula allows pouring at lower temperatures.

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A concrete slab is poured in subfreezing temperatures outside the Cold Climate Housing Research Center in Fairbanks. Additives in the mix allow the concrete to cure at colder temperatures and could extend Interior Alaska's building season by as much as two months.



Charles Korhonen, concrete expert, checks surface temperature of cold weather concrete on March 29, 24 hours after the pour. This concrete was poured over frozen substrate. SpringBoard photo.

FAIRBANKS -- A new technique for mixing concrete could extend Interior Alaska's building season by as much as two months.

The creator of the process, Charles Korhonen, demonstrated the cold-weather concrete for area contractors, Department of Transportation officials and University of Alaska professors at the Cold Climate Housing Research Center in Fairbanks last month.

Korhonen spent a decade developing a chemical compound that allows concrete to set quicker and remain unfrozen at colder temperatures. It uses chemicals readily available to contractors.

Because concrete loses strength as it freezes, Alaskan contractors are often forced to build warming tents over projects toward the end of the building season or during winter months.

"You can pour concrete any time of the year up here, but you have to go through all this stuff," said Rollo Pool, with SpringBoard, which co-sponsored the demonstration with the Army Cold Regions Research and Engineering Laboratory.

SpringBoard is a nonprofit arm of the Juneau Economic Development Council working to commercialize U.S. Department of Defense technology.

Pool said the cost saved by not having to build and heat a tent offsets the expensive cold-weather concrete, jokingly called "Arcticrete" by some in attendance.

American contractors spend \$800 million each year in energy costs to protect concrete sites from the cold, according to the U.S. Army Engineer Research and Development Center.

Using a layer of gravel to insulate against the frozen ground, Korhonen set a 4-inch slab of cold-weather concrete at temperatures rising from 20 below zero without losing strength.

The technology would allow contractors to pour concrete year-round in warmer areas of the state, and it could extend the building season in the colder northern areas into late fall and early spring.

"In the dead of winter, you're still going to have to pour it inside," said Pat Chambers, concrete manager for University Redi-Mix, which made and poured the batch of cold-weather concrete used in the demonstration.

Chambers said he wanted to monitor the strength of the concrete as it dries over the next few days but thinks contractors around the Interior would jump on the new technology as a cost-saving mechanism.

Korhonen, who received a master's degree from the University of Alaska Fairbanks and now lives in Michigan, gave a similar demonstration to contractors in Juneau earlier in the month and presented the technology at a conference in Anchorage.

He wants the process standardized in construction codes so it can be used for government and military projects.

While the process uses readily available chemicals, Korhonen said it still requires the skill of an experienced concrete mixer.

He's working to secure funding for a mathematical model predicting the stability of the process in various conditions and, perhaps, leading to future chemical mixtures that could stand even colder temperatures.

"It would make it a more robust technology than it is right now," Korhonen said.



Workers apply trowels to surface of cold weather concrete that will be used at an entry to the Cold Climate Housing Research Center in Fairbanks. *SpringBoard photo*